February 24, 1958

Paper Trade Journal

- Southern Pine Lumber Producer Opens Unbleached Kraft Mill
- New Ideas on Sodium Base Sulphite Waste Liquors Recovery
- Survey of Modern Methods of Wood Pulp Manufacture
- Annual Paper Production and Capacity Survey

University Microfilms
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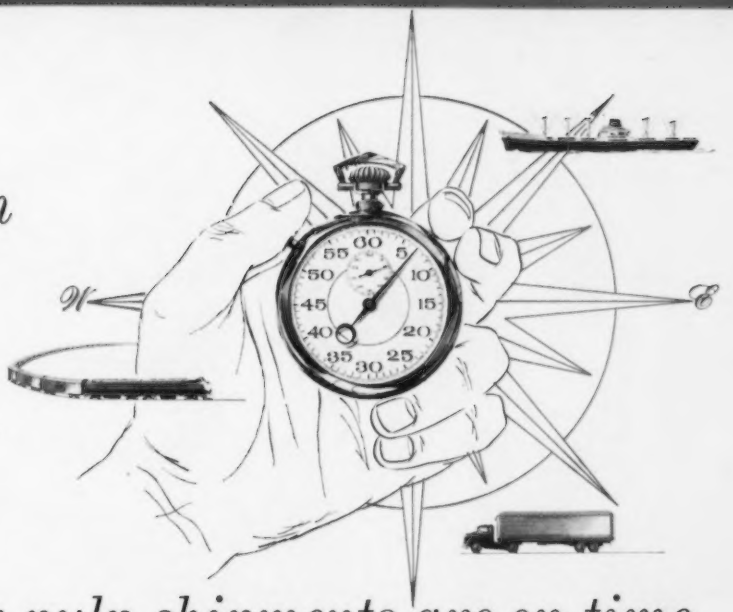

...your pulp shipments are on time

Making sure your pulp shipments leave on schedule is only one facet of expert Gottesman service—but it's crucial to pulp buyers. At Gottesman, over 70 years' experience in pulp assures you of the finest attention to quality and detail, regardless of pulp grade or quantity. That's why so many of our customers have been with us so long, some over 40 years.

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PULP PAPER EXPORT CNC

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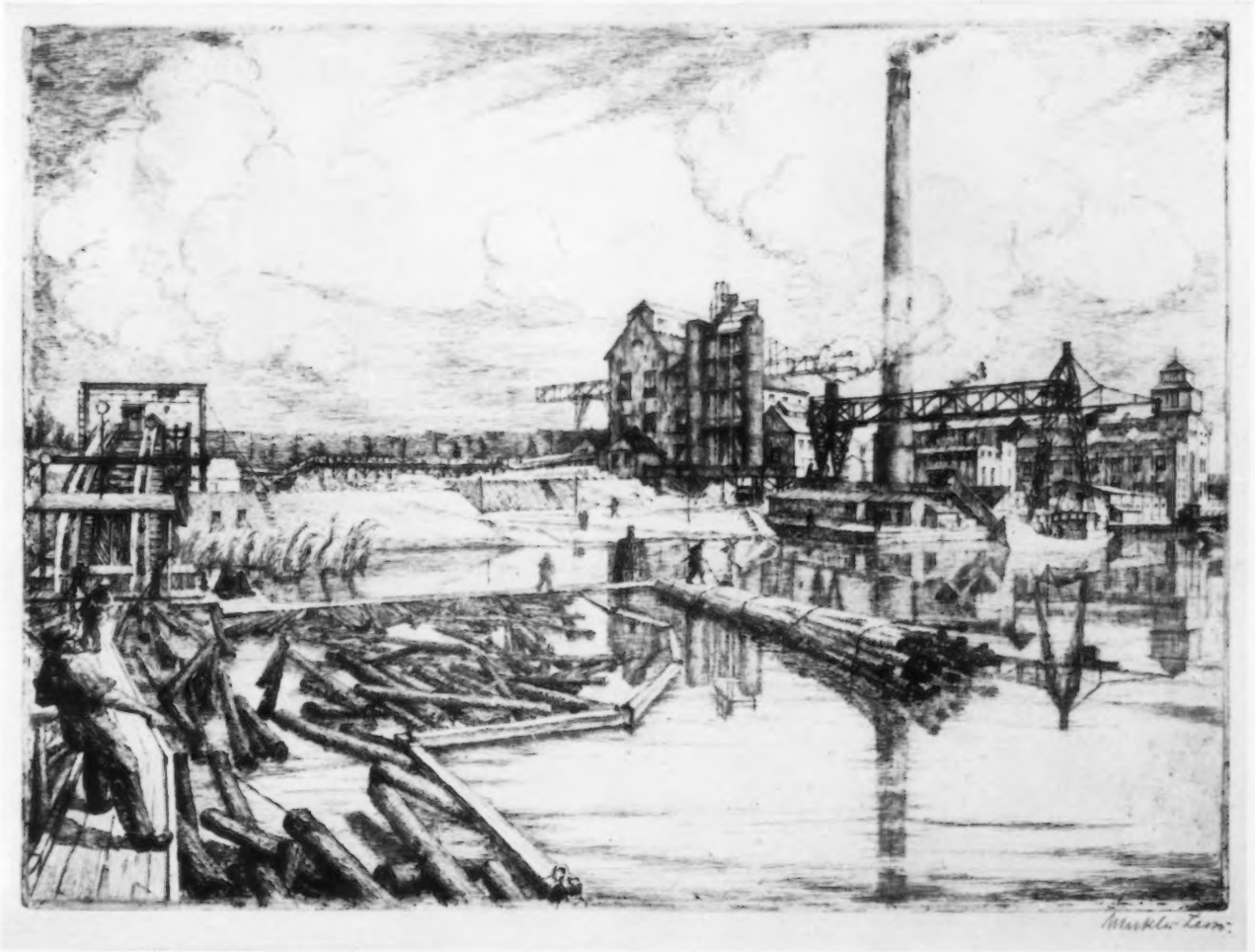

"Log Harbor" Original etching by Paul Winkler-Leers from the Asten-Hill collection.

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B.F.Goodrich report:

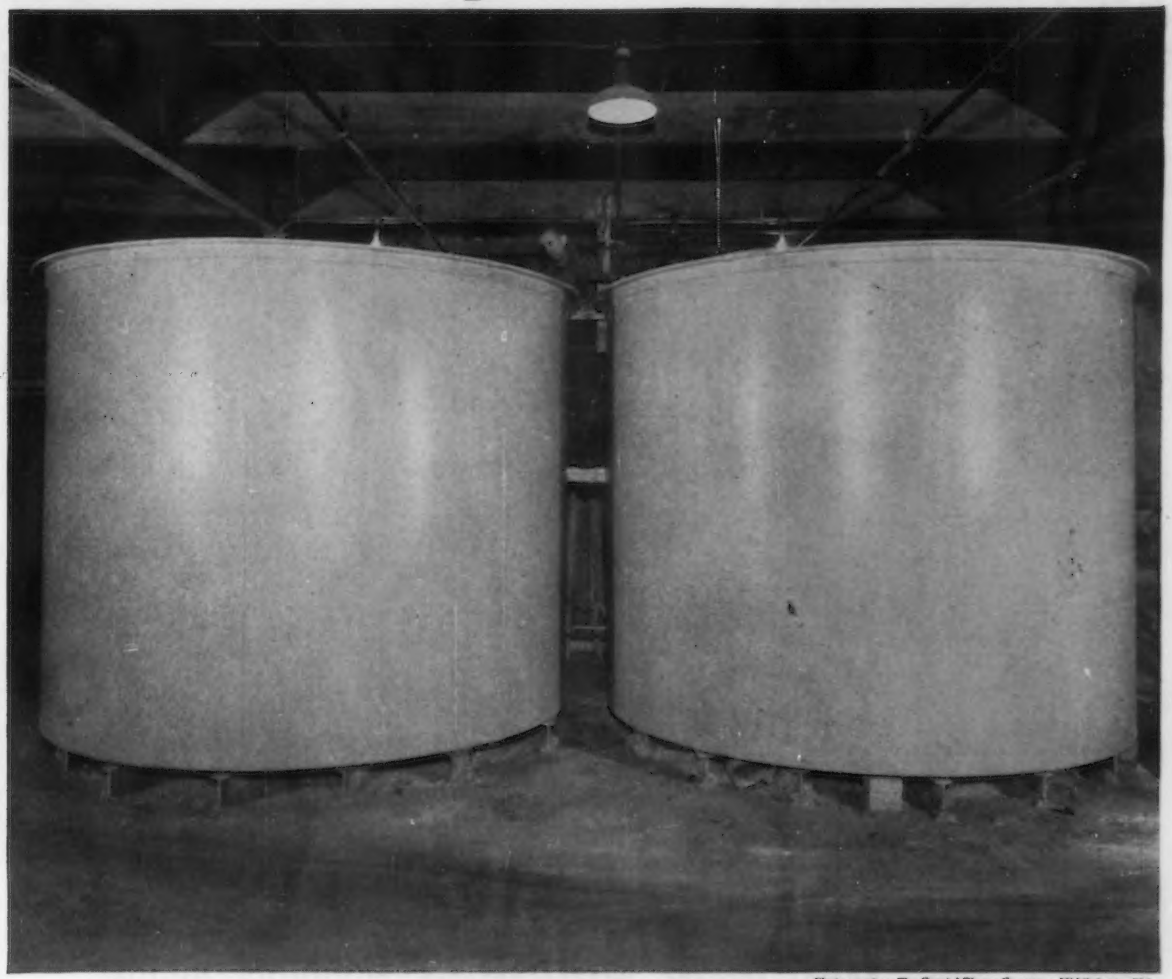

Photo courtesy The Crystal Tissue Company, Middletown, Ohio.

No holes, no leaks, no repairs—liquid alum stored safely in rubber

B. F. Goodrich improvements in rubber brought extra savings

Problem: This paper manufacturer wanted to cut costs by switching from powdered to liquid alum in their pulp mixture. But getting a tank to hold this corrosive solution was a problem. Wood tanks shrink, often leak. Lead-lined tanks require frequent repairs.

What was done: B.F.Goodrich engineers recommended Triflex rubber-lining for the two 5,000-gallon steel storage tanks. This lining is not one layer of rubber, but three—hard rubber for maximum corrosion resistance sandwiched between soft rubber for added protection.

Savings: Installed over 17 years ago, the B.F.Goodrich rubber-lined tanks pictured here are still in excellent condition, have needed no repairs on either the lining or the metal. The paper manufacturer feels that with proper care these tanks will last years more. Other tanks and pipe in the system are also B.F.Goodrich rubber-lined.

Why specify B. F. Goodrich: In the past 18 years, we have lined hundreds of tanks for alum service, as well as more than 75 railroad tank cars, several tank trucks, and thousands of pieces of pipe and fittings. While the initial cost of B.F.Goodrich rubber-lining is somewhat higher than wood or lead-lined tanks, the rubber-lined tanks do not leak, require little or no maintenance, and are, therefore, much more economical in the long run.

For more information, write *B.F.Goodrich Industrial Products Co., Tuscaloosa, Alabama, or Dept. M-287, Akron 18, O.*

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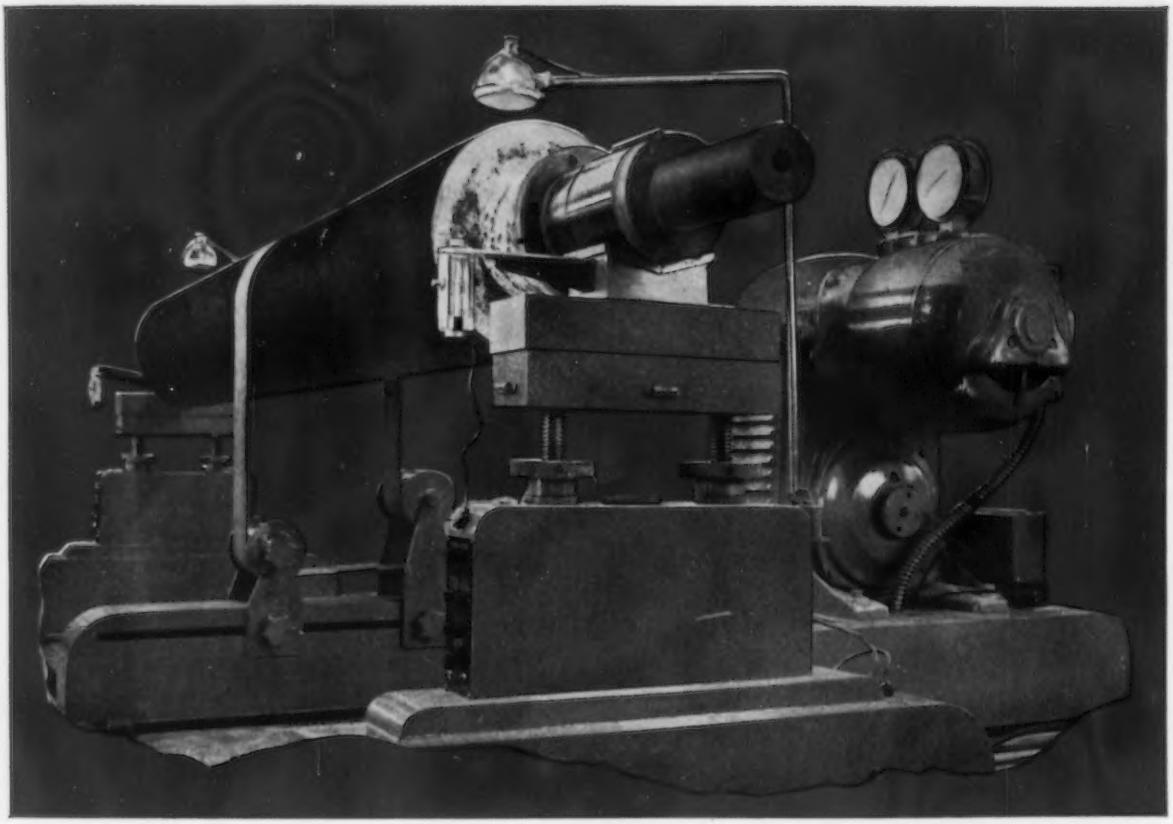

Meet the Dynamic Balancer—another factor in what it takes to make precision-perfect roll coverings

No matter how good the core, no matter how excellent the rubber cover, a high-speed roll that isn't balanced to precision perfection is sure to mean trouble. That's why, at the huge U. S. Rubber roll covering plant in Providence, Rhode Island, this latest word in roll-balancing equipment is used – the Dynamic Balancer.

When you specify dynamic balancing, your roll is put on the Dynamic Balancer and tested for exact balance, both before the roll is rubber-covered and again after it is ground, polished and ready for crating. A variable-speed drive *checks the roll at the speed you require.* Any balance deviation, no matter how slight, is electronically indicated and corrected. This means that when your roll is crated and ready for shipment, it is balanced to *precision perfection.*

The Dynamic Balancer is only one of the many advanced technological and production facilities available to paper mills who specify U. S. Rubber Roll Coverings. Quick delivery and complete service are assured because the "U. S." factory is located on major highways and the main line of a major railroad.

Contact a roll covering specialist. Get in touch with us at Rockefeller Center, New York 20, N. Y.

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United States Rubber

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Published Weekly Since 1872

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TRENDS 15

NEWS BRIEFS

International Acquires Harbor Timber Holdings 17

Boise Cascade Chooses Site Near Burley 17

FEATURE ARTICLES

Largest Southern Pine Lumber Producer Enters Paper Industry with Unbleached Kraft Mill ... 24

Some New Ideas on Sodium Base Sulphite Waste Liquors Recovery 30

Paper Production and Capacity Survey 38

Survey of Modern Methods of Wood Pulp Manufacture 44

PAPER PEOPLE	19	FIGURES OF WEEK ...	56
NEWS OF CONVERTERS	22	NEW LITERATURE	58
PRICES	42	NEWS OF SUPPLIERS ..	60
OBITUARIES	56	CLASSIFIED ADVERTISING	69

ADVERTISERS INDEX .. 74

REMEMBER THESE DATES . . .

May 14-16: TAPPI Coating Conference, Bedford Springs Hotel, Bedford Springs, Pa.

June 2-4: Technical Section, CPPA, Summer Meeting, Chateau Frontenac, Quebec City.

June 3-5: Superintendents' Assn. Annual Meetings, Statler Hotel, Boston, Mass.

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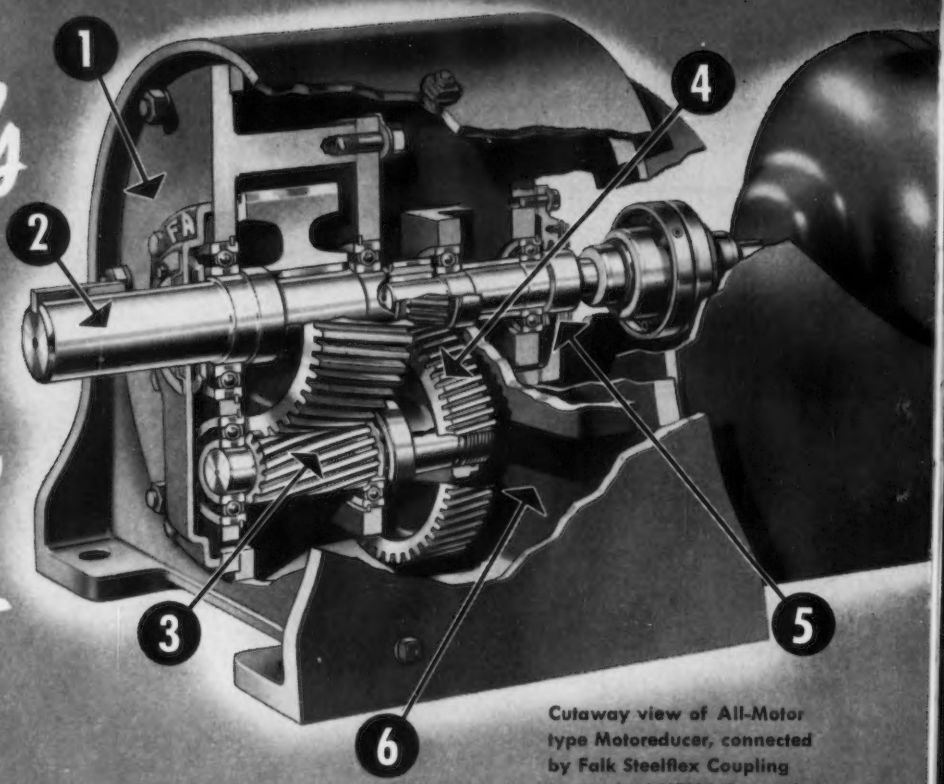


Cutaway view of All-Motor type Motoreducer, connected by Falk Steelflex Coupling to standard NEMA frame motor

WHY Falk Motoreducers give better service—have longer life

Here is the "inside story" behind the all-steel All-Motor type FALK Motoreducer's universal reputation as a gear drive unmatched in quality, efficiency, dependability, ease of maintenance and long life. These "In-built" factors are—

1 **ALL-STEEL HOUSINGS.** Rugged, strong, rigid...all parts are manufactured from heavy steel plate, formed and welded in the Falk Weld Shop.

2 **LARGE OVERHUNG LOAD CAPACITY.** Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum applied loads.

3 **PRECISION GEARING.** Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion. Quiet, crown-shaved pinions.

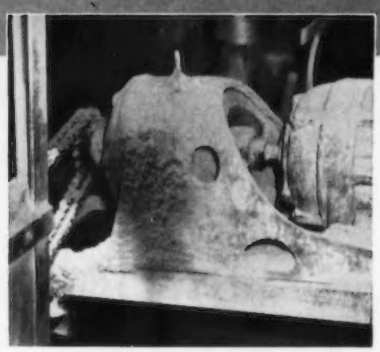
4 **EXTRA-CAPACITY GEARING.** Special extra-capacity gear-tooth form with larger contact area gives greater strength, higher load-carrying capacity.

5 **SEALED HOUSINGS.** Splashproof, dustproof, oil-tight construction. Dual closures and one-way vents keep oil in, dust and moisture out.

6 **POSITIVE LUBRICATION.** Large sump capacity...oiltight construction assures clean lubricant...revolving elements lubricated by direct dip.

When you buy or specify the All-Motor type FALK Motoreducer, you get all these—plus the tremendous advantage of full interchangeability of motors. Switch motors as desired—use any make, style or type of standard foot-mounted motor within the unit's AGMA rating—with a minimum of difficulty or "down time."

Available in sizes up to 75 hp—*with or without motor*—from convenient factory, field or distributor stocks, from coast to coast. **Write for Bulletin 3100.**



60,000 HOURS WITHOUT A FAILURE!

Sixty thousand hours is a lot of hours—but the FALK Motoreducer in the unretouched photo above has served that long without failure or need of repair.

This 3 hp unit is one of over 60 FALK Motoreducers in daily service in an Eastern plant of a large milling company, whose president says, in part:

"One of the main advantages of FALK Motoreducers is their adaptability to any motor. Reducers and motors can be easily interchanged....Our service records confirm the wisdom of our choice of FALK equipment as our standard."

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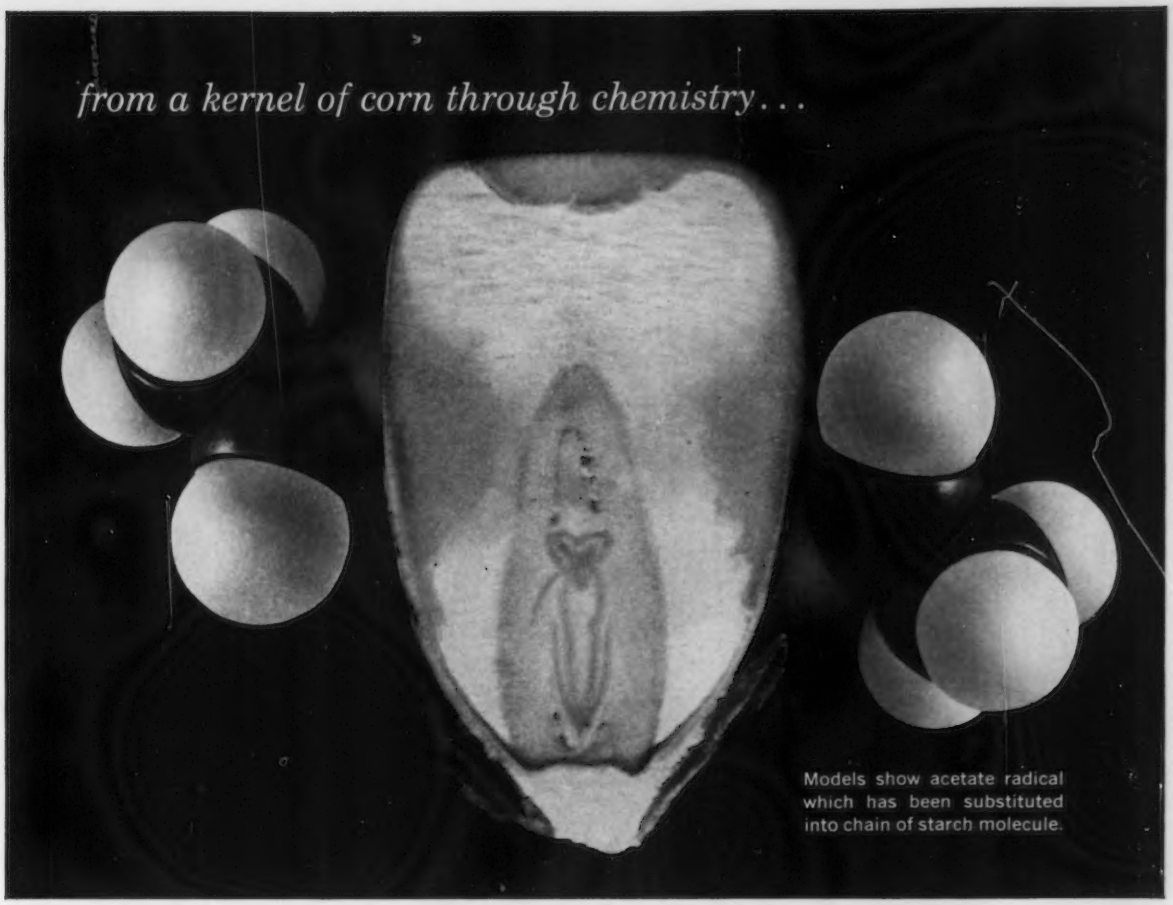
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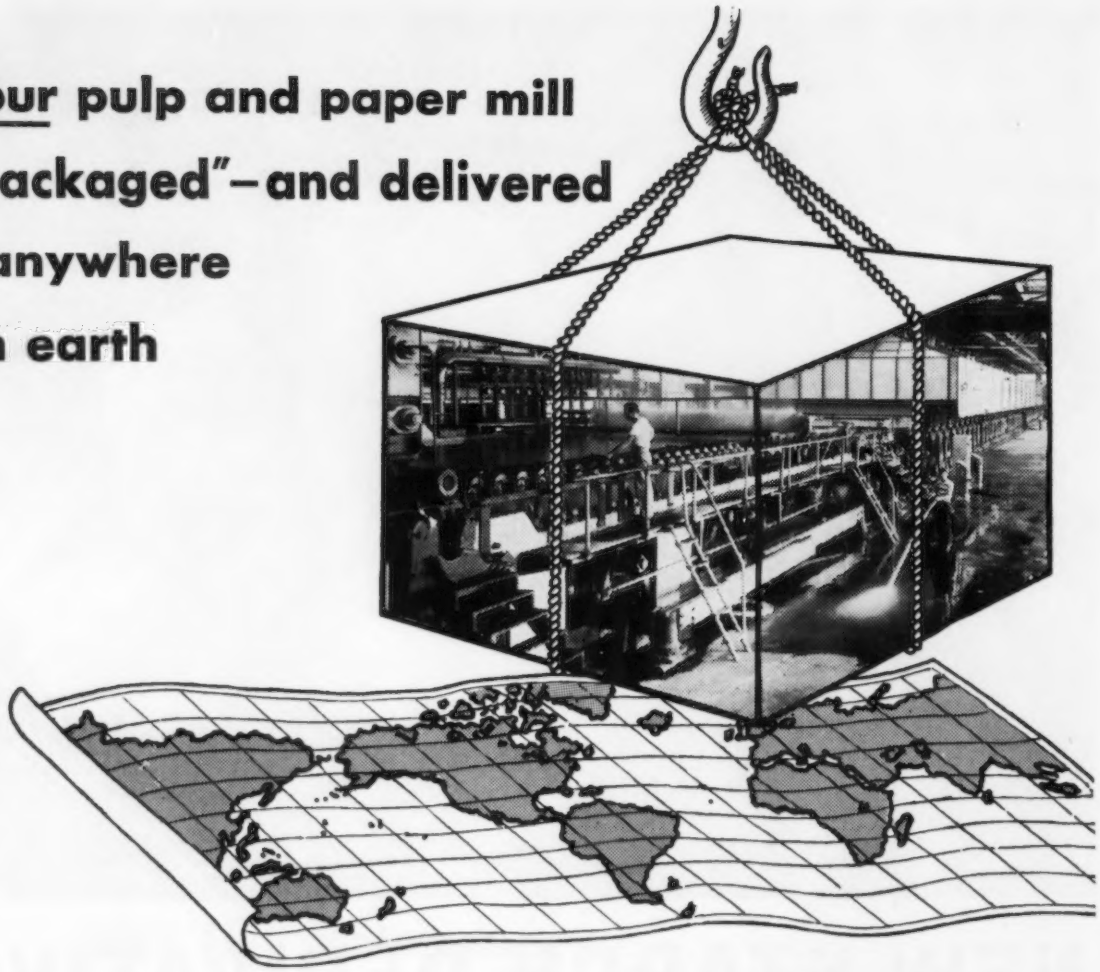

We are now building the first newsprint mill in Mexico (100 metric ton daily capacity); the first newsprint mill in Colombia (100 metric ton daily capacity); the first pre-hydrolysis kraft pulp mill in France (100 metric ton daily capacity); a straw pulp mill in Mexico (100 metric ton daily capacity); and a bagasse pulp and paper mill in Colombia (80 metric ton daily capacity). We are also supplying equipment for the first bleached bagasse pulp and paper mill in Cuba (100 metric ton daily capacity). Several other mills are in the project stage but building has not yet commenced.

Behind this concept of "packaged" paper mills stands our world-wide organization with over 100 years of experience in pulp, paper and machinery. We are equipped to render you *any* or *all* of the following services:

1. Conduct a technical and economic survey and prepare an appraisal report.
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3. Produce and deliver all the pulp and paper machinery and other necessary equipment that cannot be produced in the country where the mill is to be built.
4. Supply the necessary trained personnel to assure proper operation of the project until local workers can take over.
5. Assist the local group to obtain financing within the currencies available in the particular country, such as dollars, sterling, francs, D-Marks, Finn-Marks, etc.
6. Assist the local group to obtain the necessary raw materials and chemicals to operate the mill after it is built, as well as sell the output through Parsons & Whittemore's own offices.

Our book—"Growing with the Paper Industry Since 1853"—will give you more information on our ability to handle any pulp and paper mill project through all of the necessary steps from inception to completion or any combination of responsibilities that best suits your interests. Write for it without obligation.

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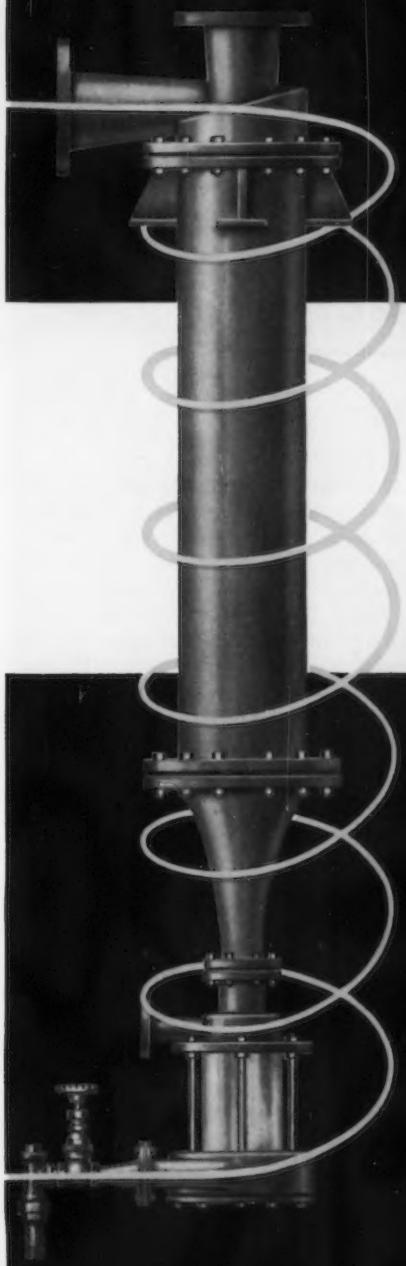

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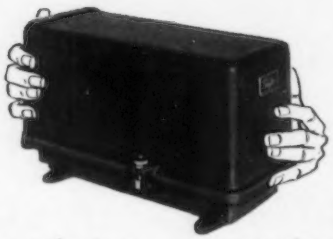


NOW we can offer you immediate delivery of the 700T Taylor TRANSET* Potentiometer Transmitter—custom-equipped for your specific application. **It's the unique** plug-in features of this instrument—plug-in amplifier, plug-in transducer, plug-in service "cans"—that make it so superior and so readily adaptable to your needs. *And it's these same benefits of flexibility that permit us to fill your orders so promptly.*

Plug-in service "cans" means that the instrument can be quickly adapted for use with different primary elements by simply plugging in the corresponding can. (For thermocouple applications cold junction compensation is provided in the can).

Just one amplifier. You change its service by switching service cans. Both the amplifier and the transducer plug-in . . . means minimum instrument down-time for service. Also means low instrument inventory because you only need one spare amplifier.

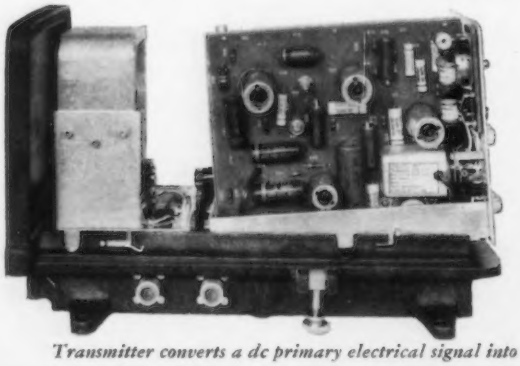
*Reg. U.S. Pat. Off.

Check these additional benefits: • Infinitely sensitive to input signal. • High order of linearity and accuracy. • No moving parts such as slidewires, batteries, or standard cell. • Continuous vernier range adjustment. • Continuous vernier zero or suppression adjustment. • Convenient front panel checkout and adjustment. • Printed circuit, for completely uniform performance. • Thermocouple burnout protection, either up or down scale.

Acknowledged by users as the finest instrument of its kind on the market, the TRANSET Potentiometer is ideal for processes permitting the use of pneumatic receivers and controllers, whether large case or miniature. Its outstanding flexibility permits a narrow or wide range span according to process demands.

• • • •

Call your Taylor Field Engineer, or write for **Catalog 98262.** Taylor Instrument Companies, Rochester, N.Y., or Toronto, Ontario.



Transmitter converts a dc primary electrical signal into a 3-15 psi pneumatic output for controllers and receivers.

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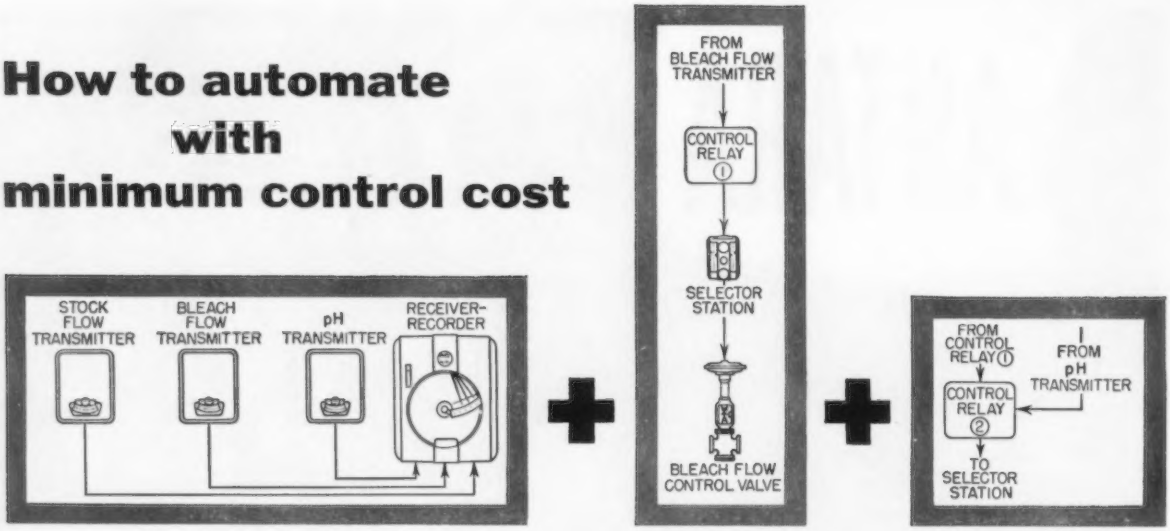
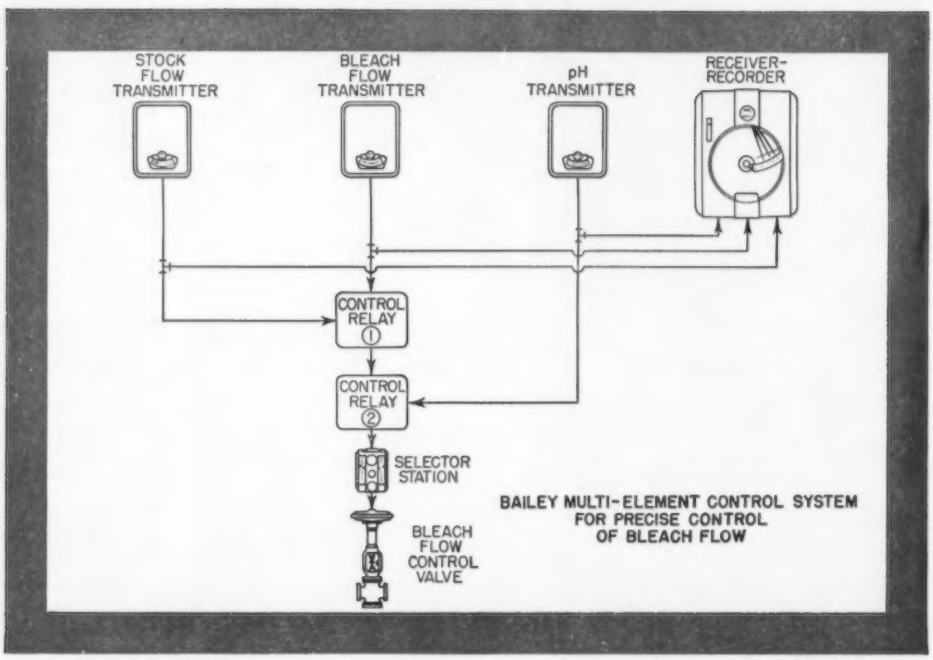
How to automate with minimum control cost





Instead of investing in an elaborate system of controls *before* you are positive of your process requirements, why not try this? Buy only the essential units first, as shown top left. Bailey Transmitters and a Receiver-Recorder measure and record the three variables.

Then as a first step toward automation, add a compatible Bailey Control Relay, Selector Station and Control Valve *for complete automatic control of one variable*, i.e. bleach flow.

All three variables (bleach, pH, and stock) can then be interrelated and automated *through just one additional Bailey Control Relay*. See last diagram.

It's as simple as that. Overall cost is low and spread over an optimum period. Maintenance and training are minimized. Your Bailey Engineer can apply his wide experience to your process too. Call him today.

P41-1

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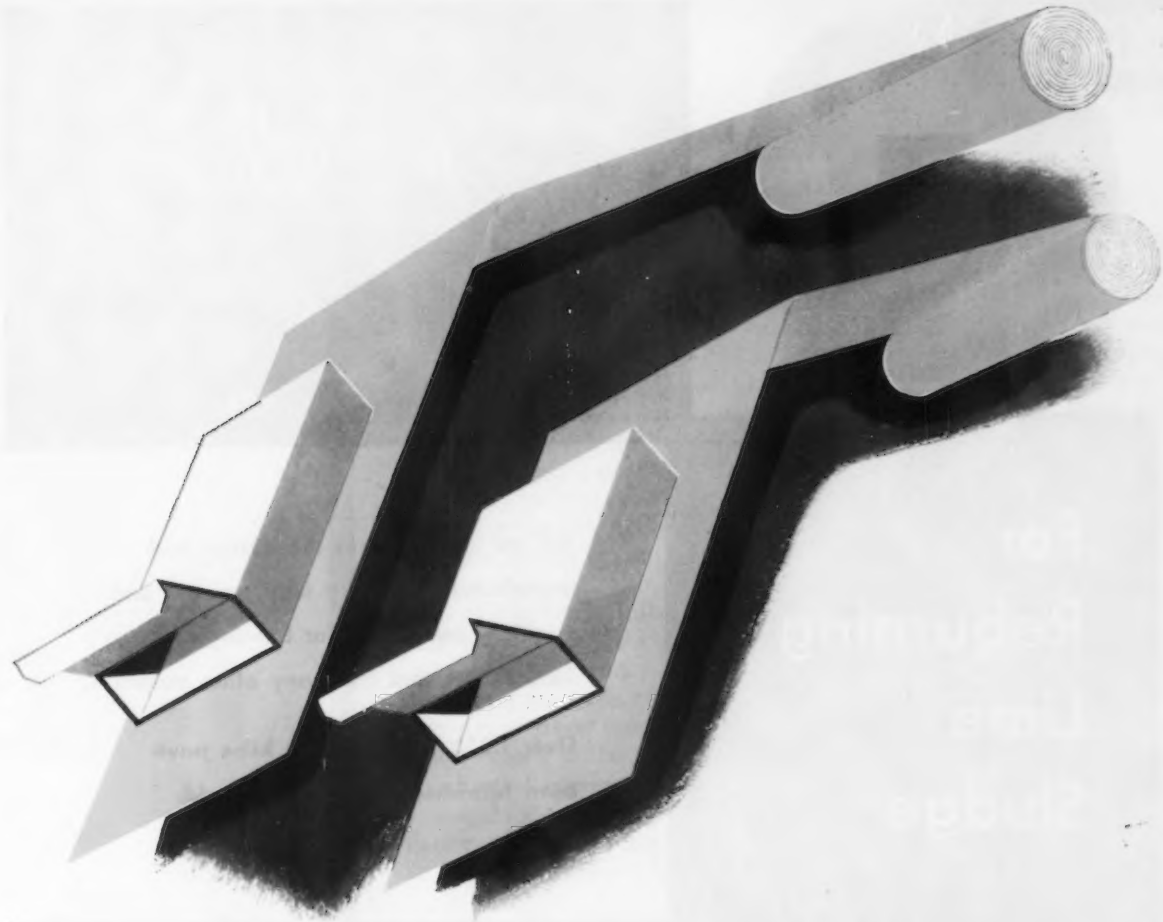

Your customers in the food industry need the protection of—

IONOL®, C.P.-impregnated packaging

• Ionol, C.P.—an extremely effective antioxidant—provides a new and better way to solve a troublesome problem for food products manufacturers.

One of the serious threats to the quality of many food products is rancidification, which destroys both flavor and aroma. Deterioration of this kind occurs most frequently during storage on the retailers' shelves. Products which suffer most from rancidification are those containing fats or oils, such as baked goods, cereals, meals, shortening, packaged meats and butter.

When Ionol, C.P. antioxidant is incorporated into boxboard or wrapping materials in which fat-containing products are packed, it protects against rancidity by retarding oxygen attack on fats—right where it starts—at the surface of carton and wrappers.

In tests, baked goods stored at 85°F in boxboard cartons impregnated with Ionol, C.P. were free of rancidity at the end of 90 days. Without Ionol, C.P. protection, packaged baked goods stored under similar conditions often become rancid within a week.

Be among those who offer their customers this effective new packaged foods protection. Write for technical bulletin SC: 55-43, "Ionol, C.P. for Impregnating Paper and Boxboard," or contact our nearest district office.

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A Look at the Recession

Recently issued Washington business figures for January and early February provide the first real 1958 yardsticks as to the extent of the recession. The unemployment figure has received greatest publicity in the daily press. The current 5.8% of the labor force unemployed compares with 6.0% in 1949 and again in 1955. The Gross National Product (index of total value of all goods and services) declined 1.5% in the last quarter of 1957 compared with the third quarter. In 1949 and 1953-54 the GNP dropped 7 and 4% respectively. Industrial production in January was at the lowest level since 1955. Without presenting further statistics we can say that while the picture is not happy there is as yet no indication that conditions will get more serious.

Has the Paper Industry?

"Has the paper industry, blinded by the glory of rising production and sales, been lacking in cost-consciousness and increased its vulnerability during a period of diminished demand by calculating its cost on the basis of maximum production? Has it been forgotten that—at a given point in time—a nickel saved on the cost side is better than a dollar increase in price, if that dollar represents only an offset of increased costs?" These were questions raised by John Vogel, APPA economist, during Paper Week. Paper Trade Journal does not hesitate to give a strong affirmative answer to both questions, an attitude which we have consistently presented in recent years.

Paper Week Survey Optimistic

Activity of individual mills is very mixed, according to a survey made by Paper Trade Journal during Paper Week. Surprising information obtained from the survey was the considerable number of paper mills operating at or near capacity. This seemed to be particularly true of producers of fine paper and top quality coated papers. Very few executives expressed serious concern about their operating rates or the general business outlook.

Consumer Advertising Illogically Off

Consumer advertising in magazines and newspapers is being cut back as previously predicted on this page. Look, Life, McCalls, Reader's Digest, etc. and daily newspapers indicate that their advertising space for the first quarter is being considerably reduced. The logic is of course irrefutable—if sales are declining then this is the time to reduce expenditures on means to promote sales. This reduction can have considerable effect on producers of publication papers and newsprint.

Optimistic Outlook for More Exports

Optimistic predictions on the outlook for increased pulp, paper and board exports to Latin America and Europe were an important feature of Paper Week. Eric Lagerloef, Secretary of the APPA Export Committee, said that good business is in the offing for those companies that take advantage of their opportunities in these markets. P. D. Allen, director of the European division, Bureau of Foreign Commerce, stated that creation of the six-nation European common market offered our industry additional opportunities to increase our export business. James L. Ritchie, U.S. Pulp Producers Assn., presented data on our expanding exports of wood pulp.

Dependable Equipment...

for the PAPER INDUSTRY

D. J. MURRAY MANUFACTURING CO.

Manufacturers Since 1883

WAUSAU, WISCONSIN

Cutting Rights Dispute Settled

International Paper Co. has expanded its already extensive West Coast timber holdings with the acquisition of cutting rights from Harbor Plywood Corp. of Aberdeen, Wash. This purchase was part of a final settlement of long-standing litigation between Harbor Plywood and the former Long-Bell Lumber Co. which was acquired by International Paper Co. in 1956. The agreement calls for International to pay two million dollars in settlement of the suit. In addition International paid $17 million for timber rights, roads and other property.

The combination of the Long-Bell and Harbor timber lands makes International Paper now a major forest owner on the West Coast as they are in the South.

Boise Acquires Container Plant Site

A site for a corrugated container plant near Burley, Idaho, has been purchased by Boise Cascade Corp. and construction will start this spring.

W. L. Mills, director of company relations for the corporation, said that ten acres about one mile southwest of the city of Burley had been purchased from David A. Taylor.

The container plant, producing all types of packaging fabricated from kraft paper and corrugated liner board, will be operated by Cascade Container Corp., a wholly-owned subsidiary of Boise Cascade.

The Burley plant will go into production in the fall of 1958, according to Mr. Mills. Another Cascade container plant is now nearing completion at Wallula, Wash.

Both plants will eventually receive their raw materials from Cascade Kraft, a pulp and paper mill to be built at the Wallula site by Boise Cascade. Until this installation on the northeast shore of the Columbia River 32 miles west of Walla Walla is completed, both container plants will purchase raw materials from other mills in the northwest.

While construction at the Burley site is due to begin this spring, a contract for the work has not yet been negotiated.

Paper and Board Production

According to the American Paper and Pulp Assn., the ratio of the United States production to mill capacity for the week ending February 8, 1958, was 88.1 per cent compared with 85.4 per cent revised for the preceding week. The ratio was 96.7 per cent for the corresponding week a year ago.

The paperboard production ratio for the week ending February 8, 1958, was 83 per cent compared with 82 per cent for the preceding week and 94 per cent for the corresponding week last year.

(Detailed statistics on page 56.)

Scott's Sea Mule Back in Operation

Sunk at its Chester, Pa. dock several months ago, the 286-horsepower sea mule "Tuffy," owned by Scott Paper Co., is back in operation after overhauling at the Wilmington, Del. yards of Dravo Corp. The 32-foot vessel was raised and towed to Wilmington where extensive hull and mechanical repairs were made.

Mead Builds Warehouse, Bleach Plant at Chillicothe

Construction of a new paper warehouse and a four-stage bleach plant is under way at the Chillicothe, Ohio, Division of Mead Corp. The warehouse extends the big storage building erected a few years ago eastward, adding 120 feet to its length. Width will be 240 feet, same as the present building.

Chillicothe's new bleach plant will be located south of the mill's digester building. It will be a four-stage operation with a capacity of 500 tons, and will provide a chlorine dioxide bleaching stage. The main part of the bleach plant will measure 70 by 72 feet, surrounded by a larger ground floor. The tower will be 80 feet high, flanked by four steel towers, two of which will also reach 80 feet in height. The chlorination tower will be rubber-lined and the others tile-lined.

After bleaching, pulp will be stored in a high density storage tank, 36 feet in diameter and 65 feet high. It will be made of steel and lined with tile.

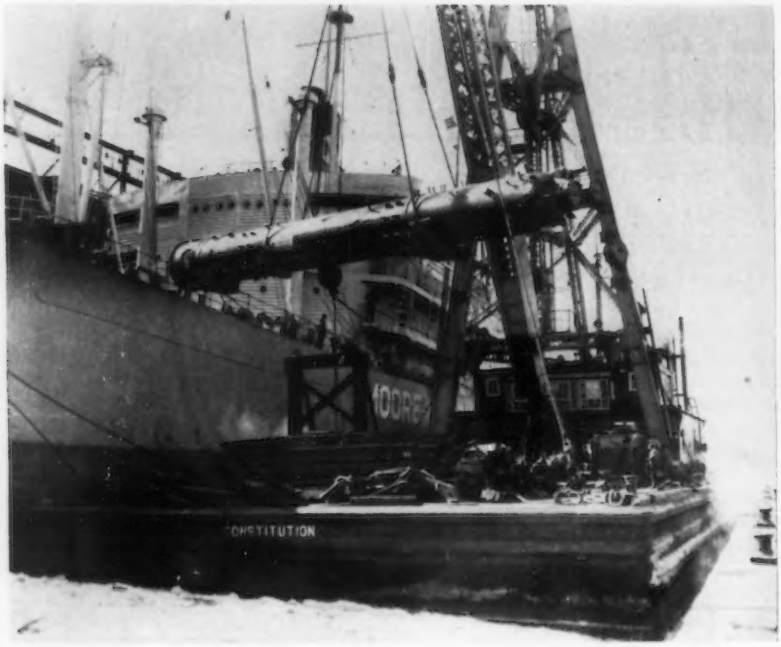
ICC Approves Rise In Freight Rates

The Interstate Commerce Commission has approved increased freight rates on a number of commodities entering this industry's operation, the majority of which have been permitted to take effect. However, the Commission is expected to hold further hearings as to the lawfulness of the increases, and if, after those proceedings, it is decided that lower increases should be ordered, carriers will be required to refund the difference between any rates collected and those later ordered.

In general, also, it is noted, the prescribed increases will be effective primarily in Eastern territory and will not apply across-the-board, in so-called Southern territory. Among increases approved, subject to the above later findings are;

Refractories, 1 cent per cwt.; coal, 10 cents per net ton; coke, 15 cents per net ton; clay, 3 per cent, maximum 2 cents per cwt.; soda ash, 2 cents per cwt.; sulphur, 1 cent per cwt.; also wood pulp, 3 per cent, maximum 3 cents per cwt.; containers, including pallets returned empty, 3 cents per cwt.

There was no increase for waste paper, paper products, or for pulpwood.



En Route to Norway

Massive reacter, 67 feet long and weighing 170,000 lbs., is hoisted aboard ship in New York en route to Norway where it will be used in Zimmerman process plant for sulphite mill waste liquor burning and chemical recovery at Aktieselskapet Boregaard. The pulp and paper manufacturer expects to put the plant into operation in 1958 at Sarpsborg near Oslo.

IWA and Pulp Union Merger Looks Likely

Al Hartung, president of the International Woodworkers of America, said recently "things are brighter than ever" for a proposed merger of his union with their International Brotherhood of Pulp, Sulphite and Paper Mill Workers.

He told a reporter that groundwork for the merger has been discussed by a special committee and a comparison of the respective union constitutions has been made.

The IWA has about 100,000 members mostly centered in British Columbia, Washington and Oregon. The Pulp Workers number about 160,000 through the United States and Canada.

Celotex Strike Settled

Union and management representatives signed an agreement February 11 that halted the twelve-week strike by Pulp, Sulphite and Paper Mill workers at the Celotex Corp. in Largo. The striking workers accepted, 93-13, a new contract giving a staggered 15-cent hourly wage increase.

KVP Announces Organizational Changes

KVP Co. Ltd. has announced the following organizational changes:

B. F. Avery becomes vice chairman of the board of directors and will concern himself primarily with matters of company policy. E. Norval Hunter is named president of the company. This responsibility will be in addition to his present ones as first vice president of KVP at Kalamazoo, Mich. and president of Appleford Paper Products Ltd., both associated companies.

D. P. Best becomes vice president and resident manager of KVP Co. Ltd. with headquarters at Espanola, Ontario. John C. Scarth, sales manager of the company, is named a vice president.

Other officers are A. H. Burk, vice president, woodlands; C. L. Felske, treasurer, and L. C. M. Palmer, secretary-assistant treasurer.

AIEE Conference Set for Raleigh

Electrical engineering aspects of the pulp and paper industry will be discussed at an American Institute of Electrical Engineers conference in Raleigh, N. C. on March 27-28. Eight papers will be presented:

Coordination of Protective Relays in a Paper Mill, W. W. Pruitt, J. E. Sirrine Co., Greenville, S.C.; Factors Involved in Selection and Purchase of Electrical Apparatus, H. B. Whiteworth, Champion Paper & Fibre, Canton, N. C.; Cypak Control of Rapid Cycle Digesters. W. A. Roth, Westinghouse, Buffalo; Static Switching Control of Rapid Cycle Digesters, G. J. Hess, General Electric, Roanoke, Va.; Evaluation of Three Wiring Systems Applied to Pulp and Paper Industry, J. F. Steedley, Bowaters Research and Development, Calhoun, Tenn.; A-C Systems for Precision Measurement of Machine Speed and Section Draw, G. M. Butler, Curtiss-Wright, Carlstadt, N. J.; D-C Systems for Precision Measurement of Machine Speed and Section Draw, W. Mikelson, G.E., Schenectady; Material Handling System with Electronic Memory for Dispatching, H. Stephenson, Jervis B. Webb Co., Atlanta, Ga.

HEADLINERS AT PRESSURE JORDANING SESSION OF N. Y. TAPPI—When members of Metropolitan TAPPI met at New York's Fraunces Tavern in January, pressure jordaning and the mechanics of stock refining in general were featured topics. The program was presented by the above trio: A. J. Felton, Black-Clawson, the principal speaker; Edward Hudson, Lowe Paper Co., chairman of the Metropolitan District; Philip Talips, Berles Carton Co., program chairman.

PAPER PEOPLE

Ralph H. Kemmerer

Donald G. Griffee

Mead Containers Appoints Industrial Relations Director

Ralph H. Kemmerer, for the past five years personnel director of the Kingsport, Tenn., division of Mead Corp., is being promoted to the new position of director of industrial relations of Mead's wholly owned subsidiary, Mead Containers, Inc.

Mr. Kemmerer will assume responsibility for the industrial relations activities of the company and its seven divisions at Cincinnati, Ohio, Chicago, Ill., Durham, N. C., Flint, Mich., Memphis, Tenn., Miami, Fla., and Toledo, Ohio. He will make his office in the headquarters of Mead Containers in Cincinnati.

Replacing Mr. Kemmerer as director of industrial relations for the Kingsport, Tenn., division of Mead Corp. is Foster L. Park. He began his 18-year career with Mead with service on the broke beaters in the Chillicothe, Ohio, division of the company in 1941.

William D. Fogleman, who has served as assistant personnel manager under Mr. Kemmerer, will hold the position of personnel manager under Mr. Park. Max D. Parsons recently promoted from Mead's paperboard mill in Lynchburg, Va., will continue to act as assistant to the director of industrial relations at Kingsport.

New Plant Engineer

Ray Black, of Hartford City, Ind., has been named plant engineer of the Pittsburgh division plant of Fort Wayne Corrugated Paper Co., McKees Rocks.

Eastern Creates New Positions

Eastern Corp. announces several promotions to newly created positions. They are:

Donald G. Griffee—to resident manager of the company's pulp and paper manufacturing activities in Lincoln, Maine, including the industry's newest bleached kraft plant which will be in full operation this spring. He joined the engineering staff of Eastern in 1946, later advancing to assistant to the superintendent of the Lincoln pulp mill, and in 1949 superintendent of the South Brewer pulp mill.

Eben M. Whitcomb Jr.—to the newly created post of technical service engineer, responsible for co-ordinating South Brewer and Lincoln mill activities with customer requirements in the field. Mr. Whitcomb engaged in construction activities in Alaska until joining Eastern Corp. in 1950. Progressive responsibilities led to his becoming assistant paper mill superintendent, Lincoln mill.

Emerson Lewis—to the newly created post of manager of materials handling responsible for all warehouse, shipping, inter-mill trucking and other service operations for the company's mills in South Brewer and Lincoln, Maine. In 1948, Mr. Lewis joined Eastern where he advanced to become assistant pulp mill superintendent at Lincoln and later pulp mill superintendent, Lincoln mill.

Paul I. Coughlin—to quality control superintendent, a newly created post with complete and independent control of paper making standards and inspection throughout both mills to assure shipment of high quality papers. Mr. Coughlin applied summer vacations at University of Maine to research, maintenance studies, and paper mill surveys with Penobscot Chemical Fibre Co., Old Town, Me., and Bird & Son, Walpole, Mass. He received his Master of Science in Pulp and Paper Technology in 1955 when he joined the technical department of Eastern. After rendering technical assistance in the company's paper mills he became assistant superintendent of the paper making department, South Brewer mill.

Promotions within the South Brewer mill are: Evander T. Quirion to paper making superintendent, South Brewer mill, and Carl O. Wedin to sulphite superintendent, South Brewer mill. Mr. Wedin has served progressively in the South Brewer pulp mill as control man, press man, steam tender, machine tender, tour foreman and general tour foreman, his most recent position prior to present promotion.

Palmer to Consult on Pakistan Mill

Consultant in the construction of a proposed pulp and paper mill in Pakistan is the position Arthur W. Palmer, West Linn, Ore., will assume. Mr. Palmer, who has been groundwood mill superintendent at West Linn, retired January 31 after 38 years of service with Crown Zellerbach Corp.

Dr. William H. Wiseman

Appointed at Covington Mill

Dr. William H. Wiseman has been appointed assistant technical director at the Covington mill of West Virginia Pulp and Paper Co. Mr. Wiseman graduated from Ohio State University with a bachelor's degree in chemical engineering and went on to the Institute of Paper Chemistry to earn his master's degree. After continued advanced study at the Institute, he recently completed requirements for a Ph.D. in pulp and paper technology.

Dr. Wiseman was with Mead Corp. at their Chillicothe, Ohio plant for two years.

G. N. Cater

A.N.D. Makes New Technical Appointment

G. N. Cater has been appointed instrument engineer of Anglo-Newfoundland Development Co., where he will be responsible for all phases of process instrumentation, including planning and engineering, application and installation, maintenance and records. Mr. Cater joined Anglo-Newfoundland in 1941 in the control department.

Cottrell Makes Baker General Manager

Charles M. Baker Jr. has been named vice president and general manager of Cottrell Co., Westerly, R. I., according to an announcement by Richard B. Tullis, president of Cottrell and executive vice president of Harris-Intertype Corp., Cottrell's parent firm.

Mr. Baker was formerly Westerly division manager for Cottrell. Albert J. Graf, formerly vice president and general manager, has been named Cottrell's senior vice president.

Changes at Northwest's Cloquet Mill

Joe J. Jenkins, manager of finishing and shipping of Northwest Paper Co. Cloquet mill, has been transferred to the general sales office as a sales representative.

Concurrent with this move, additional supervisory personnel changes were made in the Cloquet plant. Philip W. Budd became manager of finishing and shipping, and continues as manager of the sales service department that encompasses both Cloquet and Brainerd mills. L. J. Hubbell, formerly assistant supervisor, became superintendent of the Cloquet mill beater room. Thomas Spies Jr., previously shift superintendent, became assistant superintendent of the machine room.

Recent changes have also been made at the Brainerd mill: Dwight M. Brower, formerly assistant to manager of industrial service at Cloquet, became supervisor of industrial service at Brainerd; Robert R. Watkins, previously administrative assistant to manager of Cloquet finishing and shipping, became superintendent of Brainerd finishing and shipping; and Burdell L. Lower, formerly technical assistant to Cloquet supervisor of beater room, became supervisor of technical service at Brainerd.

New Mill Chemist at Consolidated

William E. Anderson has joined Wisconsin River Division of Consolidated Water Power & Paper Co. as mill chemist.

He graduated from Wisconsin State College, Stevens Point in January, where he majored in chemistry. He was first employed at Wisconsin River Division last summer. Mr. Anderson succeeds William Orcutt who was transferred to the company's technical department in Wisconsin Rapids as project engineer in August 1957.

Carolina Paper Mills Appoints New Officers

Daniel S. Cohen, vice president of Carolina Paper Mills Inc. for the past 10 years, has been elected president of the company.

Marvin A. Ross, sales manager of Carolina, has been promoted to the post of vice president in charge of sales for the firm. Both Mr. Cohen and Mr. Ross are also assuming the same respective offices in Resolute Paper Products Corp., sales agents for Carolina Paper Mills.

David Brink

David L. Brink will head the new section in woodpulp and pulp products research which the Forest Products Laboratory of the University of California is adding this year at Richmond, Calif.

Rodowski Moves to Kaukauna

Walter O. Rodowski is retiring after 41 years employment in the pulp and paper industry. Mr. Rodowski, one of the pioneers of kraft pulping in the South, has most recently been employed as kraft pulp mill superintendent at D. M. Bare Paper Co., Roaring Spring, Pa. Mr. Rodowski was engaged in the early operation of the kraft mills at Bastrop, Camden, Mobile and Savannah. More recently he aided in the start-up of the Atenquique kraft mill in Mexico. Mr. Rodowski is moving to Kaukauna, Wis. and because he is not interested in full time retirement hopes to do some consulting work.

Fleischman Retires at Wausau

Walter Fleischman, paper mill superintendent for the Wausau Paper Mills Co., Brokaw, Wis., has retired after 45 years with the firm. He is succeeded in that position by Paul Gappa, who has been assistant paper mill superintendent.

Chester W. Cone, woodlands manager for the firm, has retired after 23 years of service. Succeeding him is Ned Revie, who has been a pulp scaler.

Abitibi Promotes at Fort William

Two recent promotions at Abitibi Power and Paper Co., Fort William Division, have been announced. Thomas C. Luck has been promoted from mill accountant to office manager and R. H. Dahlin from shift foreman to steam plant superintendent.

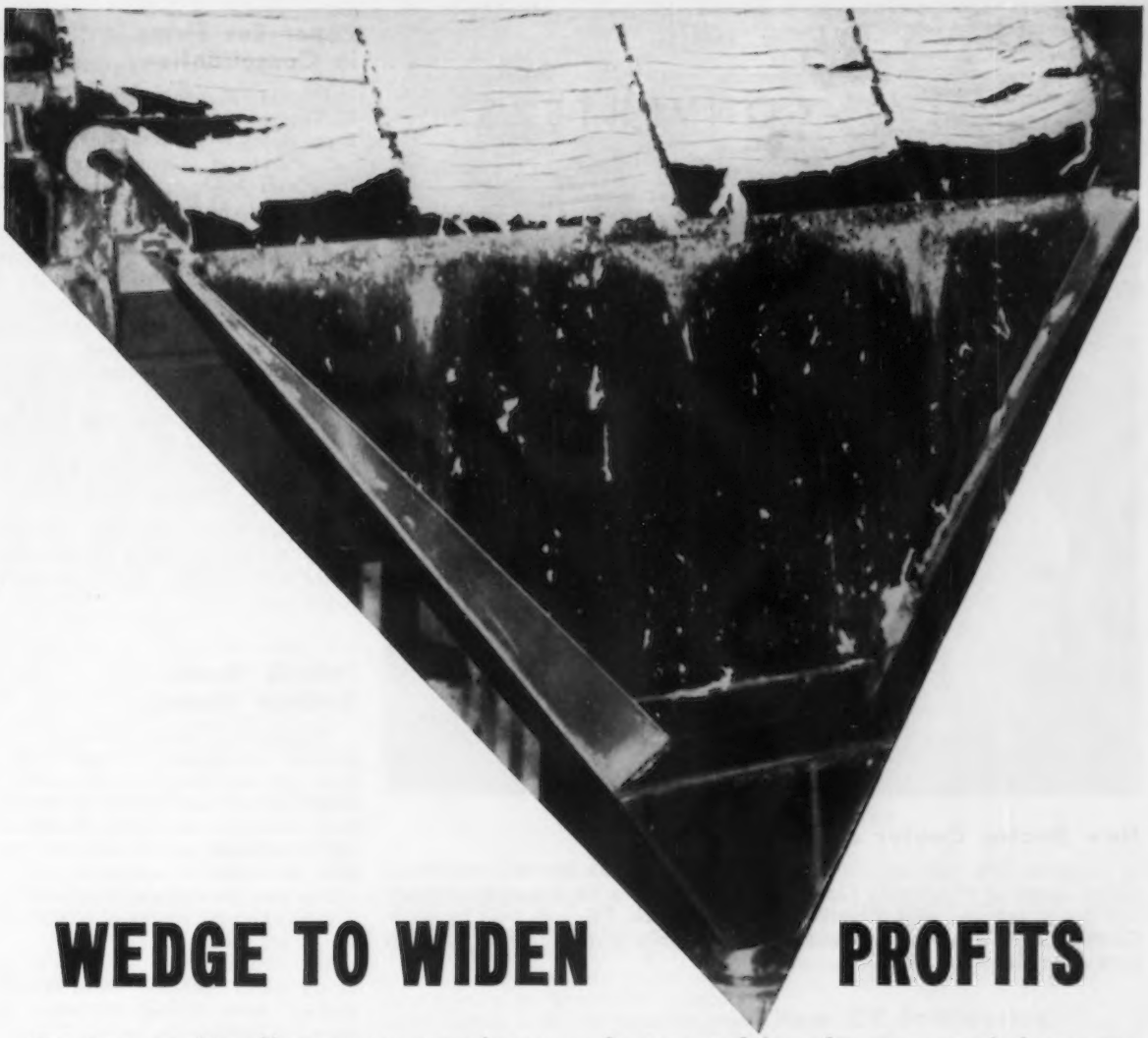
Mr. Luck joined the company at Fort William in 1940 in the stores department. Mr. Dahlin began his career with Abitibi at the Fort William plant in 1950 as a fireman in the boiler house. In 1951 he was promoted to shift foreman.

N-E Names Melson Ass't. Controller

John P. Melson has been named assistant controller of Nekoosa-Edwards Paper Co. He will continue as manager of the tax department and in addition will be responsible for administration of costs and budgets for the company.

Luke Appointment

Leo G. McClung has joined the engineering department at the Luke, Md., mill of West Virginia Pulp and Paper Co. Mr. McClung has worked for several engineering firms, most recently with Koppers Co. in Pittsburgh, Pa.



WEDGE TO WIDEN PROFITS

Good papermaking fibres are too expensive to procure and prepare to let any of them get away, especially in these days of narrowing profit margins.

Putting in a Bird Save-All to recover them is just like putting money in the bank.

Installation, operating and maintenance costs are low. Simple gravity is the separating force. No vacuum, no chemicals, no storage problems.

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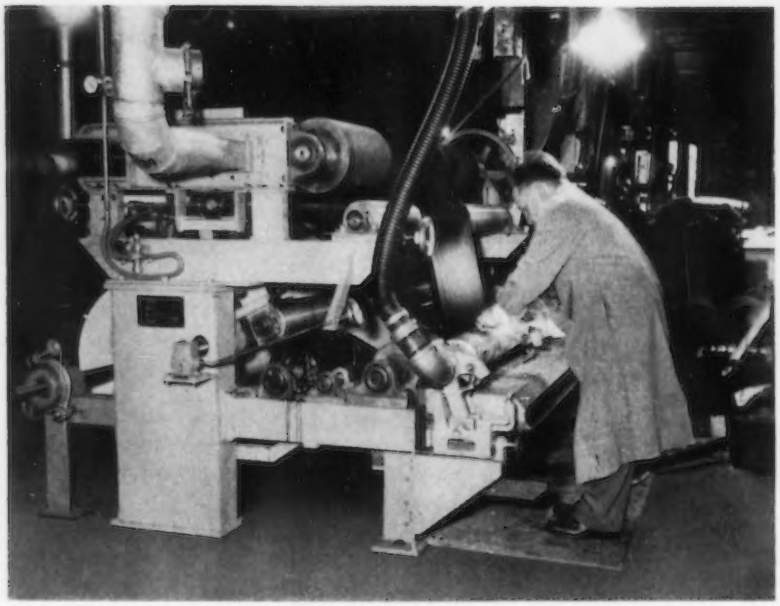
NEWS OF CONVERTERS



New Doctor Coater at Wyomissing

N. Laughrey, Dilts technical director, assists at start-up of a new Warren-Dilts air doctor coater at Wyomissing Paper Products in Reading, Pa. The open construction design provides easy accessibility to the controls. This unit, built by Black-Clawson Co., is operating on a wide range of sulphite grades of paper, handling both white and pigmented colors.

American Seal-Kap Elects President

American Seal-Kap Corp. of Delaware has announced the election of William Geisler as president of its subsidiary, American Seal-Kap of New York. Mr. Geisler succeeds Daniel A. Mackin, who becomes chairman of the board of Seal-Kap of New York.

The firm also announced plans to expand operations of Seal-Kap of New York in the fields of packaging for the food and dairy industries. The corporation makes a wide variety of products in the packaging field, including Seal-Kaps and Seal-Hoods, paper closures for the milk bottle industry—and patented snap-on lids for paper cups.

Its Constellation Cup Division makes Constellation paper cups for restaurant and home use and recently introduced the Plasti-Seal, a plastic-coated, hot drink cup. It plans a line of heavy-duty waxed cups for the dairy and food packaging industries.

Cornell Paperboard Buys Big Warehouse

Cornell Paperboard Products Co., Chicago, has purchased for one million dollars Pheoll Manufacturing Co.'s large warehouse in Cicero and will use it for the manufacture of paperboard folding cartons.

The building, erected ten years ago, contains about 120,000 sq. ft. of floor space and is located on a 10½ acre site.

W. W. Race, vice president of Cornell Paperboard, said the newly acquired facility will be operated by a subsidiary, Carton Craftsmen, Inc., consolidating operations now carried on at 813 N. Franklin St. and 5211 W. 66th Pl.

The acquisition will give the company room to expand production, said H. G. Schwartz, general manager of Carton Craftsmen. The building will become headquarters of the subsidiary.

Cornell Paperboard also makes wood fiber wallboard, boxboard, and specialty paperboards for industrial and other uses.

Paper Box Firms in Consolidation

The stock of National Paper Box Co. in Kansas City has been purchased by Paper Boxes Inc. and the merged firms will operate as National-Paper Boxes Inc., with headquarters at 20th and Tracey Sts., Kansas City.

Howard A. Salisbury is president and general sales manager of the consolidated firm, and James T. Sadler is executive vice president and secretary. They had been president and vice president of Paper Boxes Inc.

The purchase was from the estate of the late Lillian C. Newton, principal stockholder of National, who died last January 11 at the age of 81. She had been president of National since the death of her husband, Edwin H. Newton, in 1937.

National Paper Boxes Inc., will offer a full line of corrugated boxes, set-up boxes, folding boxes, paper tubes and paper cans.

Pollock Names Graham Manager

Promotion of Ralph Graham to vice president and general manager of Pollock Container Corp. was announced in Dallas by Lawrence S. Pollock. He will be in charge of sales and production at the corporations new $2,000,000 Garland plant now in operation.

This plant produces corrugated boxes with an ultimate capacity of 60,000,000 sq. ft. per month.

Mr. Graham is a 28-year veteran of the paper industry, 14 of it with Pollock. Born in Terrell, Texas, he moved to Dallas at the age of 17, joined the Pollock sales staff in 1944 and was named manager of the Dallas sales operation four years later.

Production manager at the Garland plant is Nick McClure, prominent for more than 30 years in the corrugated box field with a lengthy record of success in installing new facilities.

Old Colony's Ashley Retires

Old Colony Envelope Co., Westfield, Mass. has announced that S. Guy Ashley, for 35 years in the management of the company, retired as a vice president and member of the board of directors. He will retain his affiliation with the company on a consulting basis.

H. Malcom Wall was elected a director to fill the vacancy created by Mr. Ashley's retirement. For the first time two vice presidents were named. They are Henry F. Burrows and Arnold T. Wiggin. Other officers and directors were re-elected.

Carbon Paper Assn. Meets

F. B. MacFarland, Port Huron Sulphite & Paper Co., was unanimously elected president of the One-Time Carbon Paper Manufacturers' Assn. at its fourth annual meeting on January 30 in New York City. Mr. McFarland succeeds Samuel Meyers of Ace Carbon Paper & Ribbon Co. who had served as president of the association since its organization in 1955. Alfred Bollinger, of the Ault & Wiborg Carbon & Ribbon Division of Interchemical Corp., was chosen vice president.

Re-elected as the association's managing director was Philip O. Deitsch, who has served in that capacity for the past three years.

Of particular interest at this meeting was the association's decision to embark upon an extensive public relations program under the chairmanship of McClure Brewster of American Carbon Paper Manufacturing Co.

In addition to the president and vice president, the following were elected to the association's board of directors:

Philip Hano, Technicarbon Co., Inc.

Joseph S. Israel, Franklin Ribbon & Carbon Co.

Samuel Meyers, Ace Carbon Paper & Ribbon Co. Inc.

The association's spring meeting will be held in May, at Shawnee on the Delaware in Pennsylvania.

Ward Box Moves to Kansas City

Ward Paper Box Co. will open a new 44,480 sq. ft. manufacturing plant in the Fairfax industrial district of Kansas City, Kans. Louis L. Ward, company president, said operations were moved from Kansas City, Mo., to Fairfax in January.

The one-story building, to cost an estimated $250,000, will be of concrete block with brick veneer. The company, which employs about 75 persons, manufactures boxes for greeting cards, stationery, candy and other items.

Stone's Paper Box Div. Acquires Packard Plant

Stone Container Corp.'s paper box division has purchased the wartime Packard aircraft engine plant in Detroit. Purchase price was not disclosed. Production is expected to start at the former Packard plant in about four months, a Stone spokesman reported. The corporation already has two plants in Detroit.

William Lamprechter

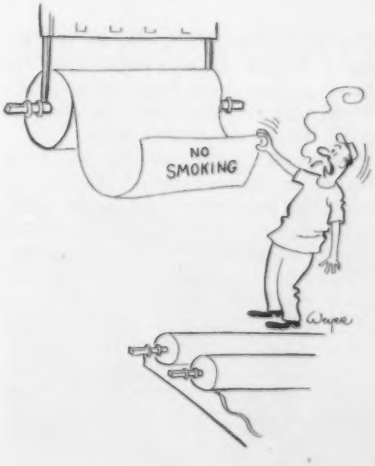
T. S. Duncanson

Business Forms Institute Elects Officers

Business Forms Institute, spokesman of the industry as its leading trade association, which held its annual members meeting in New York, February 13-14, heard from its members that 1958 is expected to equal last year in production, with increased operating costs matched by greater productivity per man hour and more efficient plant management.

The Institute installed its newly elected president, William C. Lamprechter, vice president and general manager, Stephen Greene Co., Philadelphia. He succeeds R. S. Daugherty, president of the Shelly Salesbook Co., Shelby, Ohio. T. S. Duncanson, president of Moore Business Forms Inc., Niagara Falls, N. Y., was elected first vice president. Thomas A. Taylor, vice president, Schwabacher-Frey Co., San Francisco, was re-elected second vice president, and H. M. Maloney, Greenwich, Conn., executive director.

The Business Forms Institute announced that its 1958 major plans include its annual comparative balance sheet and operation ratios survey; employee relations reports for office and factory personnel; and its public relations program. Continuing projects include: Sales statistics; capacity and actual machine hours, and material waste and paper usage reports, as well as equipment inventory.



Hayward Retires from Bemis Bag

C. E. Hayward, manager of the Mobile, Ala., plant of the Bemis Bro. Bag Co., has retired after 33 years of service. He is succeeded by W. J. Ray.

Converter Goes Up In Smoke

A fire in Elnore, Indiana recently destroyed the Elnore Paper Converters' works. The loss of the plant, which manufactured gummed paper tape, is estimated at 200,000 dollars.

New CZ Folding-Box Installation

Western-Waxide division of Crown Zellerbach Corp., producers of flexible packaging materials for the frozen-food industry, is entering the folding carton field.

A carton manufacturing operation is now being installed at Western-Waxide's headquarters in San Leandro, Cal.; delivery of the first cartons is expected in March.

Gardner-Brooks Names Fitsgerald

John T. Fitsgerald has been appointed Connecticut sales representative of Gardner-Brooks Inc. He replaces Walter Cleland who recently was promoted to director of sales development.

Gardner-Brooks specializes in the production of labels, folding boxes and greeting wraps.

Largest Southern Pine Lumber Producer Enters Paper Industry with . . .

. . . new, highly, efficient, unbleached kraft paper mill at Pine Bluff, Ark.

Paul D. Van Derveer

Associate Editor
Paper Trade Journal

Modern, highly automated, planned for efficient operation throughout, the new Dierks Paper Co. mill at Pine Bluff, Arkansas is now in operation 'round the clock. Utilizing the kraft process in the manufacture of paper and board, the new $12 million mill is located on a 1500 acre tract of land two miles north of Pine Bluff near the Arkansas River.

The mill is producing 150 tons per day from sawmill chips and pulpwood logs obtained from surrounding sawmills and Arkansas forest lands. Much of this important raw material is supplied from Dierks' timber reserve of over 1,500,000 acres in southwestern Arkansas and southeastern Oklahoma. The timber reserve is one of the nation's largest forester-supervised tree farming operations. Most of the mill's wood chip requirements are obtained from the Dierks lumber mills.

Water is supplied to the mill from two wells approximately 1500 feet in depth and pumped to the 588,000-gallon storage tank with two submersible pumps. These also supply the 100,000-gallon firetower. Together with adequate water and wood supplies, the selection of the Pine Bluff mill site was based on existing transportation facilities, including several main highways and railroads. Pulpwood, sawmill chips, and chemicals are transported to the mill chiefly by railroad.

Construction, begun approximately a year and a half ago, was handled by Rust Engineering Co., which also handled design and procurement for the new mill. The principal building in the new mill is over 600 feet long and houses the digesters, stock processing equipment, paper machine, finishing and shipping. Other buildings include wood room, chip silo, office building, and power and recovery buildings.

Operating four large lumber mills and a wood preserving plant, Dierks, in building their new paper mill, has provided for virtually complete utilization of forest products. An independent producer of kraft paper and paperboard Dierk's product will be used in the

manufacture of multi-wall bags, corrugated boxes, and grocery bags.

Conveyors Prominent in Wood Handling

Extremely efficient in wood handling methods, the new mill employs conveyors of varying sizes and types to transport logs, chips, pulps, and chemicals. Both pulpwood and sawmill chips are received in rail cars, the pulp wood to be reduced to chips, the chips to be screened before further processing.

Pulpwood-carrying cars are moved to the wood storage yard where they are unloaded either to a log haul-up chain or to storage for later use. The log haul-up chain is 243 feet long, 100 feet of its length on the flat, elevating the log 30 feet to the barking drum. The barking drum, having a capacity of 20 to 30 cords per hour, is 12 feet in diameter by 45 feet in length. Bark removed here falls to a conveyor beneath the barking drum which carries it to a 68-foot high conical shape refuse burner. The main bark conveyor is 200 feet long, with a 24-inch wide belt running on 20° troughed idlers.

The barked logs pass to a wide flat belt conveyor carrying them past a sorting area where an operator removes incompletely barked logs to the 60-foot long reject chain conveyor. This returns the rejected logs to the barking drum. Fully barked logs are carried to the feed of a Carthage chipper driven by a 500 h.p. induction motor. The chips are blown to a cyclone on the roof of the woodroom.

This cyclone also receives sawmill chips directly from railroad cars. These are hopper-type cars containing approximately 35 tons each. Car shakers are utilized in removing chips from the hopper cars which empty onto a 72-inch wide belt feeding to a 180-foot long by 30-inch wide conveyor belt running on 20° troughed idlers. This conveyor carries the chips to the above mentioned cyclone. At present, approximately 60 per cent of production is from sawmill chips, and this ratio is expected to increase in the near future.

Chips fall from the cyclone separator to a trough feeding two Rotex vibrating screens. Rejects are conveyed to a small rechipper and blown to the cyclone for re-screening. Accepted chips are then conveyed to the top of a 60-foot high chip silo by a 340-foot long, 36-inch wide belt conveyor. The concrete silo of 65,000 cubic feet capacity was made in a continuous casting by a slip-form process employed by Rust Engineering Co.

Only one man is required for wood room operation. When producing chips from the logs, he is stationed at the

CONVEYORS transport sawmill chips from hopper car to woodroom at left for screening and then to chip silo for storage.

Dierks' Huge Timber Reserves

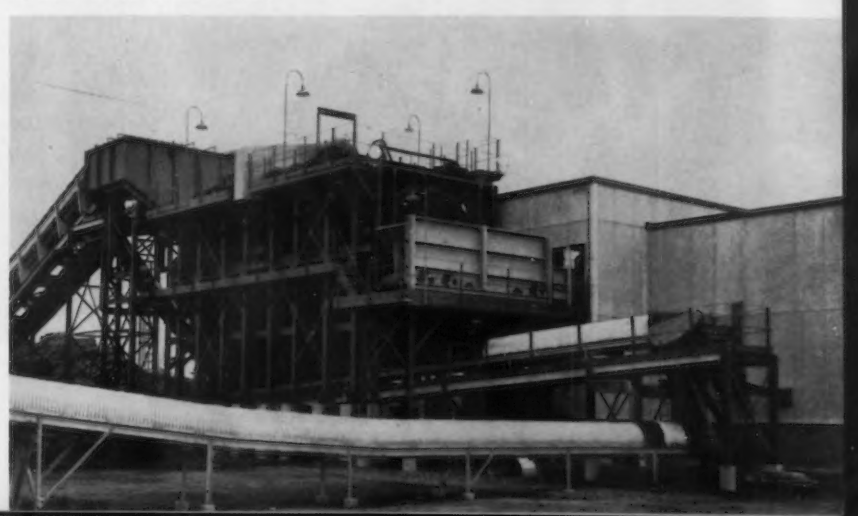
The new $12 million paper mill at Pine Bluff marks the entry of Dierks Forests, Inc. into the pulp and paper industry. The 75 year old lumbering company is the nation's largest producer of southern pine lumber, and has timber reserves of over 1,500,000 acres of timberland in southwestern Arkansas and southeastern Oklahoma, one of the nation's largest forester-supervised tree farming operations.

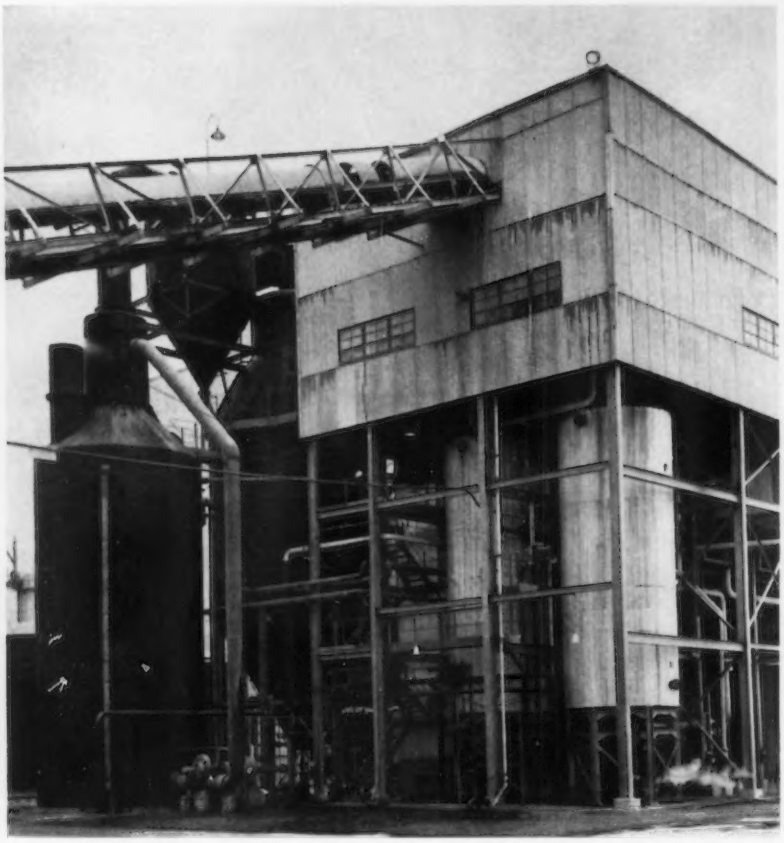
The company operates two railroads, the Texas, Oklahoma & Eastern, and the DeQueen & Eastern. The latter was extended to join with an extension of the Missouri Pacific, enabling chips produced at the Dierks lumber mills at Wright City, Okla. and Dierks, Ark. to be transported to the paper mill.

In addition to these two mills, the company operates lumber mills at Broken Bow, Okla. and Mountain Pine, Ark., and a wood preserving plant at DeQueen, Ark. The wood preserving plant and the new paper mill will give the company virtually complete utilization of its forest products.

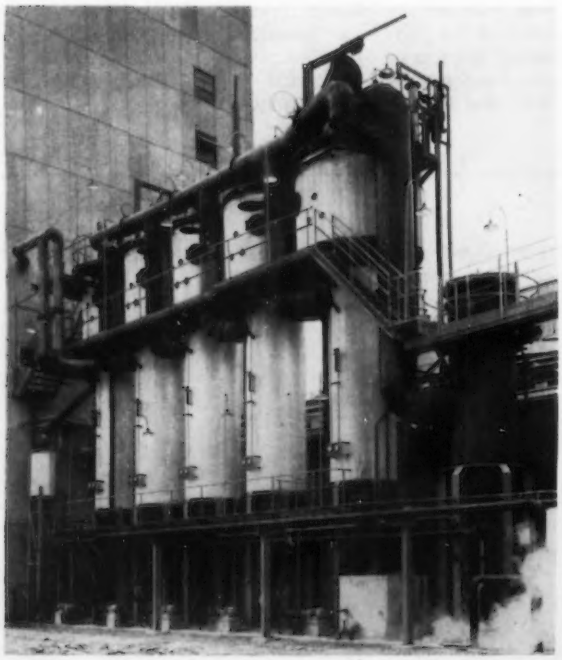
Administrative and sales offices of the company are located in Hot Springs, Ark. Directing the activities of the company are F. H. Dierks, president; D. V. Dierks Jr., vice president; F. M. Dierks, vice president; Peter D. Joers, vice president; and F. McDonnell Dierks, secretary-treasurer.

BARKING DRUM and woodroom. Bark falls to conveyor beneath drum and is carried to the refuse burner.





TWO DIGESTERS discharge into blow tank at left. Hot water accumulator tank is at far left.



FIVE EFFECT EVAPORATORS play prominent part in recovery system. Fifth unit has split body with two effects.

sorting table. When unloading hopper cars of sawmill chips, he is stationed near the unloading area. The rest of the operation is almost entirely automatic except that a crane operator and assistant are required when making chips at the mill.

Cooking Process

Chips are removed from the base of the storage silo by a rotary feed table 17-feet in diameter. These chips are fed to another long belt conveyor which elevates the chips 65 feet to the digester room. The conveyor is approximately 260 feet long, and charges chips to the digesters in amounts regulated by a weightometer. Adjustments in the chip charge can be made at the control panel by the digester operator.

There are two digesters, both 12-feet in diameter having a capacity of 4000 cubic feet. Approximately 46-48 tons of chips at 50-55 per cent moisture are charged to each digester. About 8800 gallons of white liquor are metered in and black liquor added for make up. Approximately 20 minutes are required to charge chips to a digester, and cooking time is two hours fifteen minutes. The two digesters operate in alternate cooking cycles. The digesters are equipped with air-operated capping valves and operation is controlled from an instrument panel.

After the cook is completed, pulp and black liquor are blown to the top of the 62-foot high, 24-foot diameter blow tank of 107,700 gallon capacity. Gases, together with some fiber and liquor carry-over, pass to a cyclone where the fiber and liquor are separated and returned to the blow tank. Gases then pass to the 91,700 gallon hot water accumulator tank where they are condensed and collected for further use.

Washing, Screening and Refining

Pulp and black liquor are pumped from the blow tank to the 12-foot vibratory knotter. Knots removed here are returned to the cooking process, and the pulp passes to a three-stage washing system covered by a Transite panel hood. The washers are eight-feet in diameter with 12-foot face. Water from the accumulator tank is used in the third stage. Filtrate from the three stages is collected in tanks below the washers, and used as wash water; the filtrate from the third stage being used in the second stage, and that from the second stage used to wash the first stage. Foam from the filtrate tanks is skimmed off through pipe lines connecting into a foam tank where sprays break the foam. Some of the weak black liquor, at its highest solids content in the first stage filtrate tank, is used as

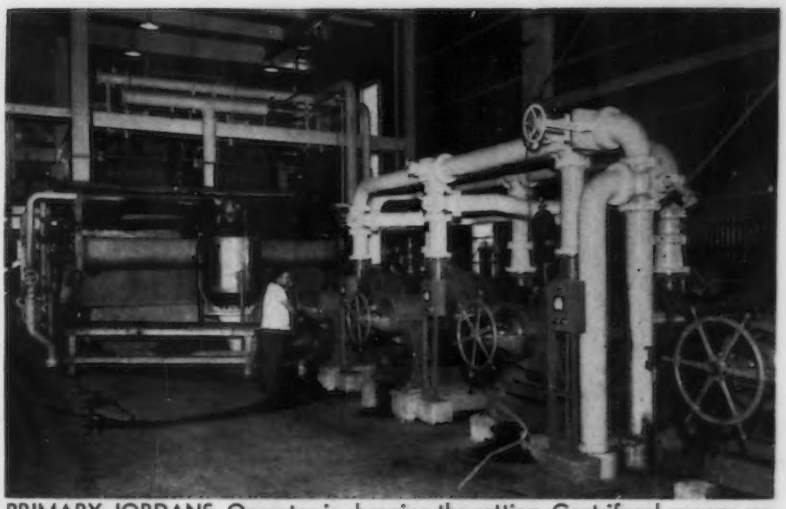
make-up liquor in the digester; it is also used for dilution in the blow-tank. The remainder is pumped to the recovery system.

Pulp from the third-stage washer is carried by a 30-foot long belt conveyor to the 30-foot high, 20-foot diameter high density storage tank. Located outdoors, this tank has a capacity of 49 tons of pulp at 15 per cent consistency. The high density stock is diluted at the base of the tank by mining nozzles and pumped to three Impco No. 4 centrifugal screens belt driven by 50 h.p. motors. Rejects pass to a double disk refiner and are returned to the process ahead of the screens. Accepted pulp from the screens flows directly to the decker, an Impco vacuum filter. The stock then flows to a DeZurik open type consistency regulator and the deckered stock chest. Consistency at this point is 3½ per cent. The chest is of tile construction with rounded ends and midfeather, and has a capacity of 3700 cubic feet.

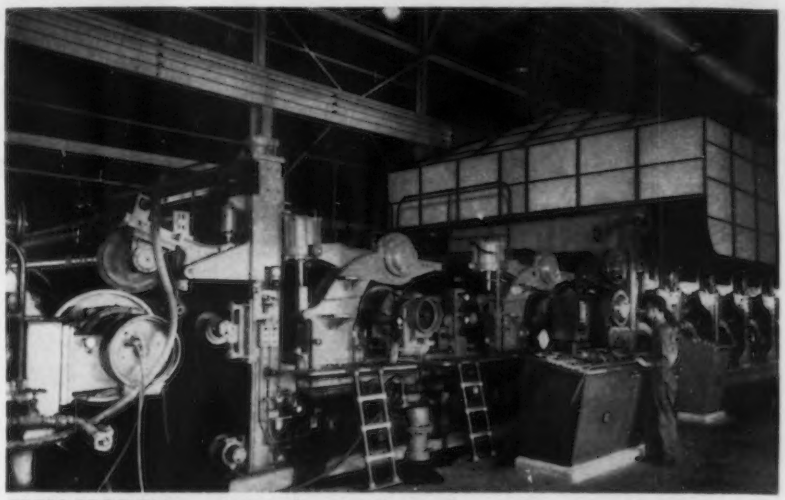
Stock from this chest is pumped to three primary, or beater, jordans for an initial refining, and then flows by gravity to the machine chest which is similar in size and construction to the deckered stock chest. Pumped from this chest to two secondary, or tickler, jordans, the stock receives a final touch-up refining. The stock is next diluted with white water to approximately 0.65 per cent consistency and pumped to a bank of eight primary contrifugal cleaners. Rejected stock from the primaries is further treated in secondary and tertiary cleaners, with a small amount of rejects from the tertiary going to sewer.

Recovery

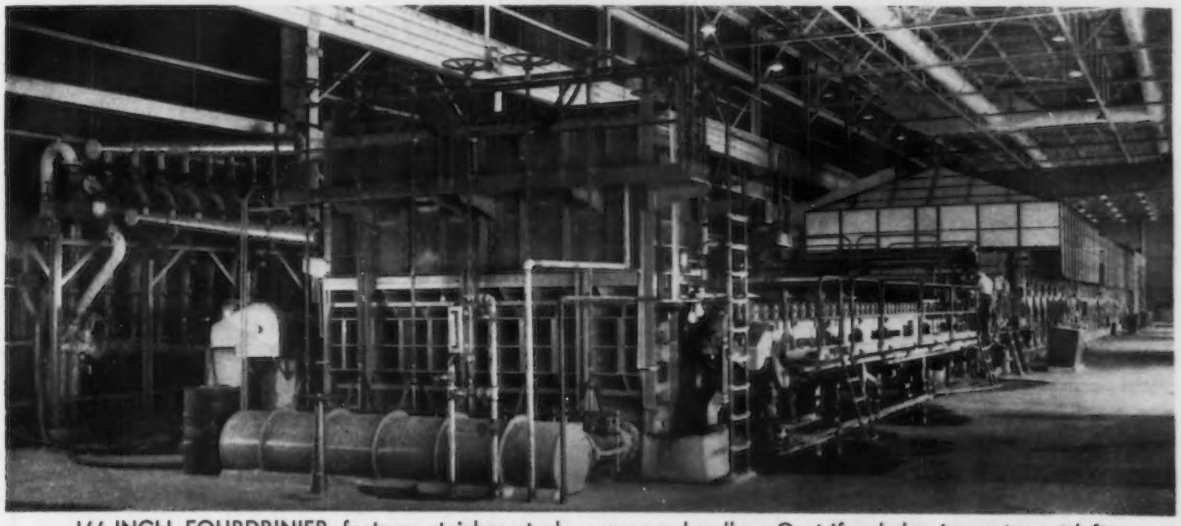
Weak black liquor from the first stage washer is pumped from the filtrate tank



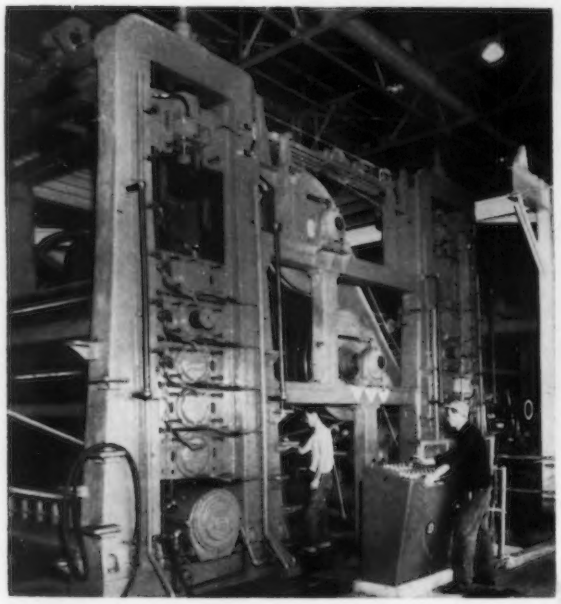
PRIMARY JORDANS. Operator is changing the setting. Centrifugal screens are located on the mezzanine.



PRESS SECTION, consisting of suction first and second presses and smooth press, is operated from instrument console.



166-INCH FOURDRINIER features stainless steel open open headbox. Centrifugal cleaning system at left.



CALENDER STACKS, one 8-roll and one 6-roll, have two paper driers mounted between them.

WINDER will handle rolls up to 72 inches diameter. Hydraulic lowering table is shown receding into floor.

to the foam tank and then to a storage tank. From this tank the liquor at about 15 per cent solids goes to the five evaporators. Soaps are removed from the second effect to a storage tank and then to a tank car. This is sold and shipped to another plant for tall oil recovery.

From the evaporator, the liquor goes to the strong black liquor storage tank at about 45 per cent solids, and then to the recovery boiler. This is a 165-ton-per-day unit capable of burning 495,000 pounds of dry solids per 24 hours producing 72,000 pounds per hour of steam. Salt cake is removed from the flue gases with a wet bottom precipitator.

The remainder of the system consists of dissolving tank, green liquor clarifier, primary and secondary slakers, three re-causticizing tanks, white liquor clarifier, lime mud clarifier, washer, and filter. Lime mud cake from the filter is fed by screw conveyor to the 8-foot diameter, 250-foot long lime kiln. The kiln, of the latest design, has a capacity of 75 tons per day of reburned lime producing highly uniform lime pebbles. The hot lime conveyor to the primary slaker is a 70-foot long wrought iron bucket conveyor.

Paper Machine

Accepted stock from the centrifugal cleaners flows to the 16,000 g.p.m. 30-foot head fan pump and to the head box of the paper machine. The stock may be further diluted just ahead of the fan pump, and alum may also be added

List of Suppliers

Bauer Bros.	Stock cleaners, refiner
Bell Automation Corp.	Weightometer
Black-Clawson Co.	Fourdrinier, reel, winder, calenders
Byron Jackson	Submersible pumps
Carthage Machine Co.	Chipper
Chain Belt Co.	Bucket conveyor for lime
Chicago Bridge & Iron Co.	Tanks
Combustion Engineering	Recovery boiler
Dodge Mfg. Corp.	Couplings
DeZurik Corp.	Consistency regulator
Dorr-Oliver	Recausticizers
Erie City Iron Works	Power boiler
Emerson Mfg. Co.	Jordans
Falk Corp.	Speed reducers, couplings
Fibre Making Processes, Inc.	Barking drum, digesters
Farrell-Birmingham Co.	Roll grinder
Fuller Co.	Airveyor
Graver Water Conditioning Co.	Clarifier system
Goslin-Birmingham Mfg. Co.	Five effect evaporators
Harnischfeger Corp.	Overhead crane
Improved Machinery Co.	Washers, screens, decker
J. O. Ross	Washer and machine hoods
Link-Belt Co.	Rotary feed table, conveyor drives
Murray, D. J., Mfg. Co.	Re-chipper
National Conveyor & Supply Co.	Car shakers
Northern	Overhead crane
Nash Engineering Co.	Vacuum pumps
Orville Simpson Co.	Rotex chip screens
Research-Cottrell, Inc.	Precipitator
Rust Engineering Co.	Design, engineering and procurement
Rovang & Associates	Digester capping valves
Traylor Engineering and Mfg. Co.	Lime kiln
Warren Steam Pump Co.	Pumps
Westinghouse	Motors, power stations, turbine

at this point. The paper machine is a new Black-Clawson 166-inch wide unit featuring a stainless steel open headbox, permanently cantilevered fourdrinier and a press section consisting of suction first and second presses and a smoothing press. The drier section is made up of forty 60-inch diameter paper driers and three felt driers, as well as a breaker stack and size press. The driers, of 164-inch face, are designed for 100 p.s.i. steam. A Transite panelled hood covers the drier section. Completing the machine line are one eight-roll and one six-roll calender stack with two paper driers mounted between them, a Black-Clawson Rolliflyte reel and a Model 40 B-C winder. The winder, driven by a 200 h.p. d.c. motor will handle rolls up to 72 inches in diameter at speeds to 3200 feet per minute. The paper machine operates through a B-C spiral bevel gear drive and is designed to operate at speeds up to 1500 feet per minute.

Located in the basement, a Hydrapulper handles broke and trim from the machine. The trim feeds to the pulper through a chute. Broke caused in the drier section is allowed to fall into the basement onto a 34-foot long conveyor feeding the Hydrapulper. The conveyor, controlled from an instrument panel above, consists of four 24-inch wide belts in parallel. Repulped stock from the Hydrapulper is pumped to a tile broke chest which is located in the basement, together with the deckered stock chest and machine chest.

The heavy rolls of paper are moved from reel to winder by a 10-ton overhead traveling crane. Tightly wound rolls up to 72-inches in diameter are removed from the winder onto a hydraulically operated table which lowers the rolls to floor level. They are then lowered by elevator to the floor below where the rolls are wrapped and moved to waiting railroad cars by lift truck.

F. M. Dierks, vice president, and J. C. Plumlee, general superintendent, are pleased by test results shown by sample sheet.

THESE MEN OPERATE DIERK'S NEW MILL: Front row: H. H. Weeks, N. G. Cerniglia, pulp mill tour foremen; B. F. Williams, R. H. Windle, paper mill tour foremen; J. C. Causey, assistant to plant engineer; M. J. Cook, chief chemist; M. R. Koonce, assistant to chief chemist; R. A. Scott, chief electrician; R. L. Richey, plant engineer; D. R. Pichon Jr., industrial relations manager. Back row: U. T. O'Neal, paper mill tour foreman; J. R. Maxwell, T. P. Gould, pulp mill tour foremen; J. J. Jordan, paper mill tour foreman; W. R. Talley, pulp mill superintendent; F. H. Singletary, paper mill superintendent; F. M. Dierks, vice president; J. C. Plumlee, general superintendent; T. J. Malone, master mechanic; J. Q. Kurz, wood procurement superintendent; R. R. Watson, office manager.

Some New Ideas on Sodium Base Sulphite Waste Liquors Recovery

1–New System for Carbonating NSSC Liquors
2–New Method for Sodium Sulphide Conversion
3–New Scheme for Collection of Spent Liquor

Nils V. Mannbro
316 Second St. W.
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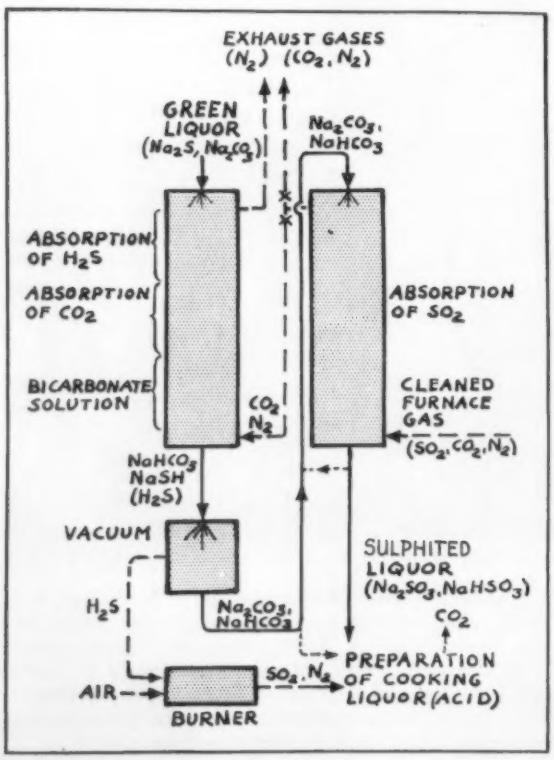
The main problem in sodium base sulphite liquor recovery is to convert the sulphite, either in the smelt from the furnace or in the green liquor, over to sulphite for the cooking liquor without simultaneous formation of $Na_2S_2O_3$. Besides developing methods for direct conversion of the sulphide to sulphite, almost all the work reported in solving this problem has been concentrated upon separation of the sulphide as Na_2S or H_2S and then oxidizing it to Na_2SO_3 or SO_2, respectively.

Work by the author on recovery of sodium base sulphite liquors in the kraft process has led to studies of sulphite liquor recovery processes, separate from the kraft process. The first one described here includes a flue gas carbonation system and refers particularly to recovery of NSSC spent liquor. The second is a sodium sulphide recycling process which would be applicable to all kinds of sodium sulphite recovery.



1—New system of carbonating NSSC waste liquor.

Carbonation Systems

Among the various methods of converting over the sulphide to sulphite, carbonation with flue gas or CO_2 from other sources has been frequently mentioned *(1) (2) (3)*. The Na_2S is converted to Na_2CO_3 and the H_2S is released and burned to provide SO_2, with which the carbonate solution is sulphited so as to obtain Na_2SO_3. One of the serious problems in this process has been to burn the H_2S in the low concentrations obtained. The author has developed a process which solves this problem. The principle is to carbonate the liquid just below the point when H_2S is given off and then to apply a vacuum to the hot liquor so that H_2S is given off in a highly concentrated form. Operation of the system is shown in Figure 1.

Sulphide Recycling Development

Studies of the Stora Kopparberg recovery process *(4)*, which originally did not include recovery of SO_2 in the furnace gas by scrubbing with Na_2SO_3 solution, led the author to propose different unpublished schemes for recovery of this SO_2. He proposed that a precarbonation as carried out in Fig-

ure 1 should improve the supply of CO_2 to such an extent that carbonated liquor could be used for absorption of the SO_2 in the flue gas. Later in this work on carbonation methods, schemes were developed which included the use of the Sulfox smelt component separation system *(5)* for crystallization of Na_2CO_3 from a concentrated Na_2S solution. Only the concentrated Na_2S liquor obtained by this system should then be carbonated. Thus as no CO_2 is consumed for carbonating Na_2CO_3 to $NaHCO_3$ this modification also improved the CO_2 balance in connection with recovery of SO_2 in the furnace gas.

After the Mead recovery system *(6)* was first published, the possibility of returning concentrated or diluted H_2S gas to the recovery furnace according to this system was also studied. Finally the question rose, Why not return the concentrated Na_2S liquor itself to the furnace? This solution to the sodium base sulphite liquor recovery problem is believed to have been new.

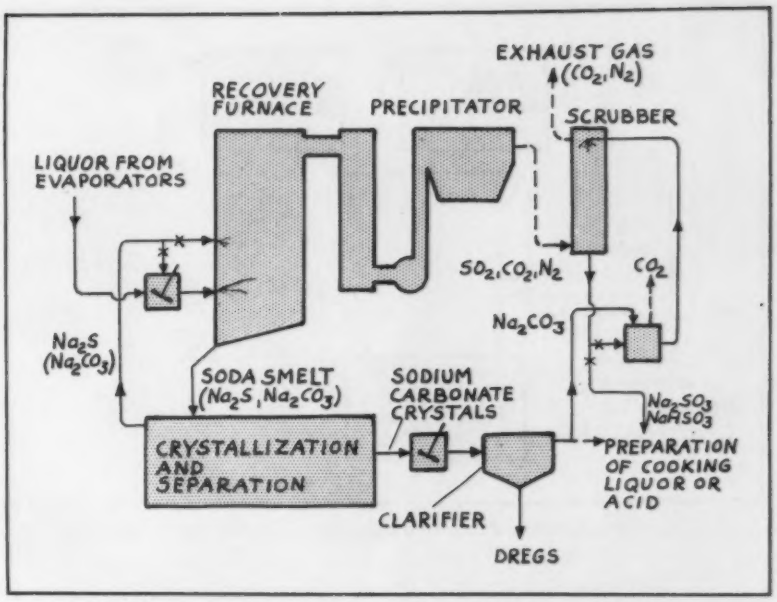
Some months after these studies, Western Precipitation Co. described a somewhat similar recovery process *(7)*. It was based on a liquor fixing system involving oxidation of a mixture of Na_2S and spent liquor before evaporation. They made mill runs using their process and thereby proved that smelt component separation could be carried out on a mill scale.

Evaporation of sodium base sulphite liquors seems no longer to present problems. More expensive stainless steel evaporators are used but in the long run, better heat transfer and lower maintenance costs may compensate for the higher original investment.

The smelt from the furnace preferably contains the sodium more as Na_2CO_3 and less as Na_2S and other sulphur compounds. The equilibrium of the different sodium compounds is thermodynamically determined in the smelt (*9*). But above the smelt zone in the furnace more or less SO_2 will be formed depending on how much the sulphur compounds in the liquor will decompose or be carbonated and finally form SO_2. Thus a disadvantage of such a liquor fixing method appears to be evident. Conversion of Na_2S to more stable compounds before it is introduced into the furnace will cause the re-formation of more Na_2S that would have to be separated and recycled to the furnace.

New Sulphide Conversion Method

A preferable scheme to this recovery process is shown in Figure 2. The Na_2S solution either as such or mixed with evaporated liquor is introduced into the furnace. The Na_2S is largely decomposed and/or carbonated. Its sulphur content is converted to SO_2 in the furnace gas and the sodium to Na_2CO_3 in the smelt. The SO_2 in the furnace gas is absorbed in the scrubbing tower by the Na_2CO_3 solution prepared from the Na_2CO_3 crystals separated from the smelt solution. Thus a Na_2SO_3 and/or $NaHSO_3$ solution is obtained ready for a new cooking and recovery cycle.



2—New method of converting sodium sulphide to carbonate.

The crystallization of Na_2CO_3 from the dissolved smelt should be carried out according to the best methods. Because of the higher solubility of Na_2S its solution is concentrated to a high degree in this crystallization stage. This concentration is so high that the solution when mixed with liquor from the evaporators for re-introduction to the furnace, gives a concentration of solids in the resulting liquor that is only slightly lowered.

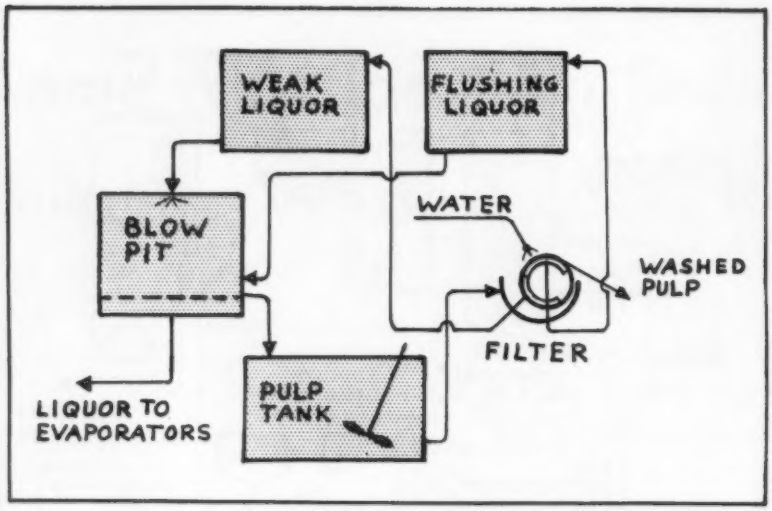
Depending on the efficiency of separation and washing of the Na_2CO_3 crystals, some Na_2S will remain in the soda liquor to the scrubber. However, it will be carbonated and the H_2S released with the exhausted gas. This loss is of small importance but it is possible to recover the H_2S by using an additional scrubber with for instance a liquor containing bisulphite. Some of the Na_2SO_4 from the smelt may crystallize out together with the Na_2CO_3. However, it is known that Na_2SO_4 will not cause any trouble in cooking.

When burning liquor from regular sodium bisulphite cooking, the furnace gas will contain about 0.85 per cent SO_2 calculated on dry gas. Under the same conditions the smelt will contain 41 per cent of the sodium as Na_2S.

By using a separate reduction furnace instead of the liquor burning furnace for reduction of the precipitator saltcake recovered from the furnace gas *(1)*, a still lower concentration of sulphur compounds in the smelt can be obtained. Sodium sulphur compounds are more completely reduced to Na_2S in the reduction furnace than in the liquor furnace. The Na_2S from the reduction furnace is mixed with the Na_2S separated from the smelt solution and converted to SO_2 and Na_2CO_3 in the liquor furnace. As a result of the higher concentration of Na_2CO_3 in the smelt, the amount of smelt and thus also the heat leaving the furnace with the smelt will be smaller. (As a further step to reduce the amount of circulating sodium compounds, Na_2S from both sources can be carbonated and H_2S released. This carbonation need not be complete as a certain smaller amount of liquor from the crystallization stage is to be recycled to the liquor furnace anyway. The H_2S can be burned alternatively in a separate furnace or in the liquor burning furnace. This modification will, as already indicated, result in a larger part of the smelt being separated as carbonates. However, this modification leads more or less back to a system which involves handling of H_2S gas.

The chemicals obtained in this process can be used for a number of cooking methods in one or more steps. Patents are pending for this recovery process since 1956.

Recently the author has learned that



3—New scheme for washing pulp and collecting spent liquor.

Western Precipitation also has suggested recycling the Na_2S solution directly to the furnace *(9)*. Moreover a report from the University of Washington *(10)* was recently published which involves a variation of the same process. Judging from the conclusions of these reports, the sodium sulphide recycling process shows promise of being the best solution of the problem.

Collecting Sulphite Spent Liquor

The spent liquor should be collected with small loss of solids and at a low dilution. A system suitable for use in sulphite mills which combines washing in blowpits with a final washing on two-stage vacuum filters has been studied by the author earlier *(11)*. Figure 3 shows such a scheme. Washing in the blowpit with weak liquor from the first-stage of the filter can be carried out more or less completely within the time allowed. The pulp is flushed out with flushing liquor, from the second-stage of the filter into a tank where it is agitated and the liquor diffuses out of the fibers. The subsequent washing on the filter is performed in two washing zones from which weak liquor and flushing liquor are obtained as previously mentioned.

NSSC Liquor Recovery

As the yield of pulp is high from NSSC cooking, the ratio of combustible solids to cooking chemicals is low. This circumstance is unfavorable to the recovery of NSSC spent liquors by evaporation and burning. NSSC cooking is often carried out with recycling of the spent liquor. This means that the cooking chemicals can be better utilized. However, without recovery and with or without recycling the dissolved wood constituents must leave the system with the actual amount of used cooking chemicals and cause water pollution. However, evaporation and burning, as previously described, is the only solution for many NSSC mills.

Where an NSSC pulp mill adjoins a kraft mill, as is sometimes the case, the spent liquor is mixed with the kraft liquor for evaporation and recovery of the chemicals. If an NSSC mill were built alongside a sodium base sulphite mill the NSSC liquor could be re-processed in the sulphite mill recovery system with the latter's spent liquor.

Other Interesting Possibilities

There are other interesting possibilities. The author has a patented process *(1, 15, 16, 17)* for the use of sodium bisulphite spent liquor in the kraft mill. Known as the "Silfate" process, this involves using the sulphite mill spent liquor in place of water in the recovery furnace dissolving tank. The author has found that by "Silfate" cooking *(1, 15, 16, 17)* of high yield kraft pulps a remarkable gain in yield based on the Roe number is obtained in comparison with ordinary kraft cooking. This work will be published later.

The author has also proposed *(12)* to make a separate NSSC recovery system more attractive by using calcium base spent sulphite mill-liquor to replace water in preparation of NSSC cooking liquors (the calcium being precipitated as $CaCO_3$). He has named this the "Silfite" process. It is even more advantageous if sodium base sulphite spent liquors are available for NSSC liquor preparation *(12, 13)*. The residual sulphite in this liquor is utilized and the different organic compounds, for instance the lignosulphonic acids, seem to have a favorable buffering effect on the NSSC cook. Preliminary investigations have indicated that the yields are higher. Also the concentration of solids in the NSSC spent liquor from the digester will be increased.

Utilization of sodium bisulphite pulp mill spent liquor when available for NSSC pulp washing in connection with an NSSC chemical recovery system also has obvious advantages.

The author wishes to acknowledge with thanks the help received by Dr. Ralph W. Gordon in the preparation of the manuscript.

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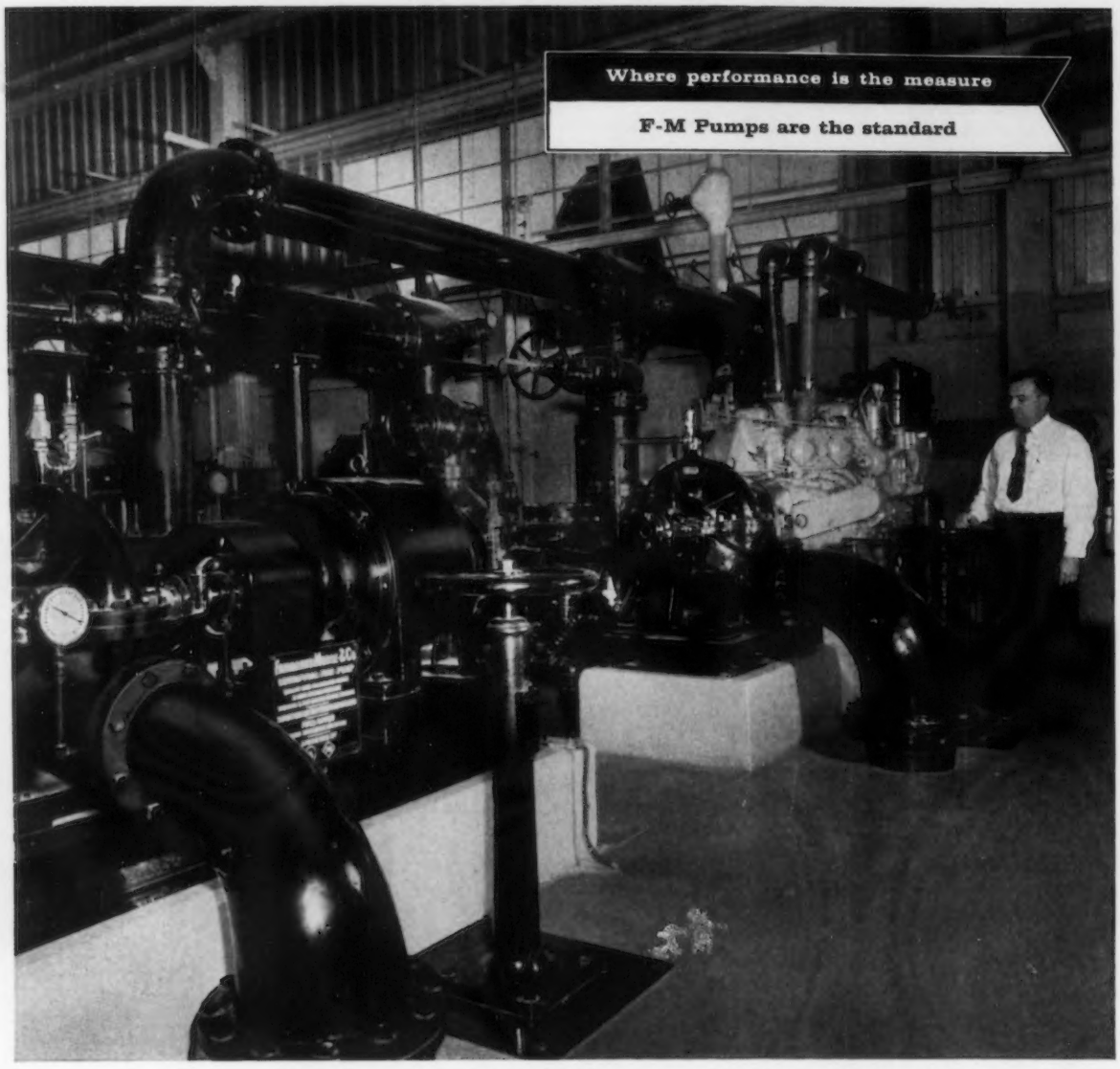

Mr. George Biggar, plant engineer of Ford Motor Company assembly plant at Mahwah, N. J., checks Fairbanks-Morse fire pumps (1500 gpm. motor-driven pump in foreground, 2500 gpm. diesel-driven pump near Mr. Biggar).

Ford guards against fire at giant new plant

To protect one of the world's largest auto assembly plants against fire, Ford Motor Company depends on these two Fairbanks-Morse fire pumps. As the heart of an extensive system, the two F-M pumps provide defense in depth, one pump backstopping the other.

This installation is typical of the great care and planning by modern industry to prevent the catastrophe of fire. Call in your F-M Sales Engineer for expert assistance in pump specification. As builder of the world's greatest variety of hydraulic combinations, Fairbanks-Morse will provide the exact type, exact size pump you need for maximum dependability.

For information write Fairbanks, Morse & Co., Dept. PTJ-2-24, 600 S. Michigan Ave., Chicago 5, Ill.

Ask for F-M Fire Pump Bulletins 5814F (horizontal) and 6920F (vertical).

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John W. Benninghofen says . . . .

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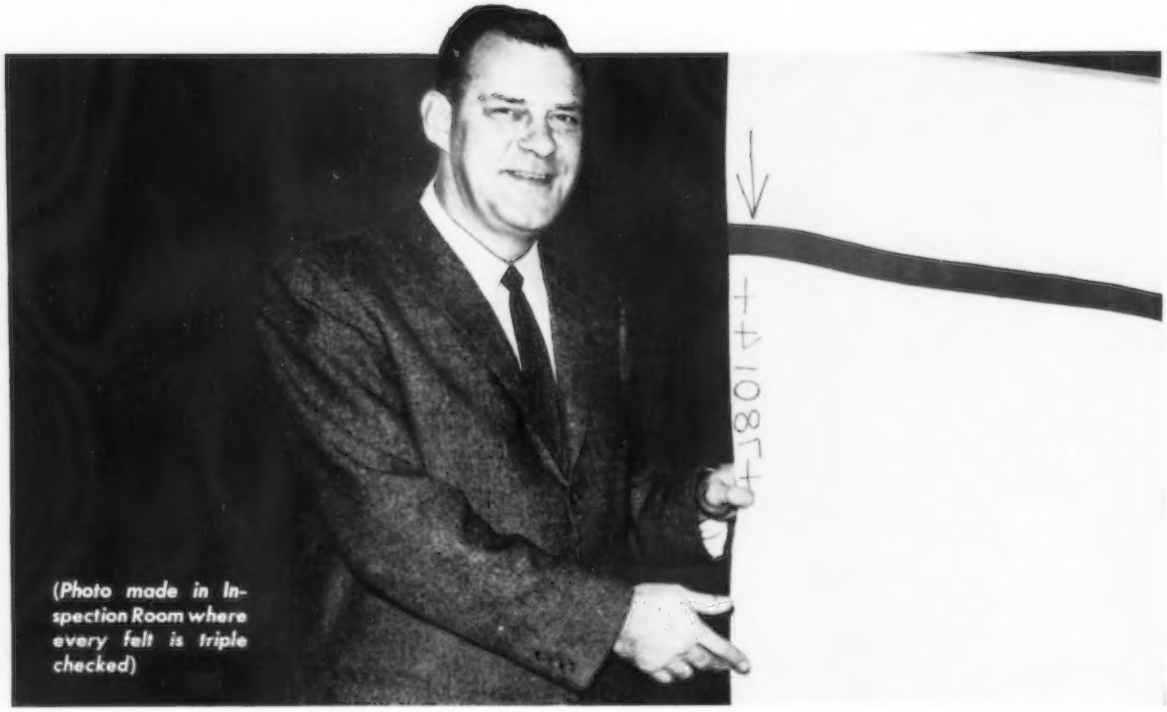

(Photo made in Inspection Room where every felt is triple checked)

HAM FELTZ says:

"It's wonderful to be a hundred years old and as modern as Shuler & Benninghofen. That's why, after 5 generations, you can't beat Hamilton Felts"

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" TO YOU, *this* Hamilton Felt may look like any other.
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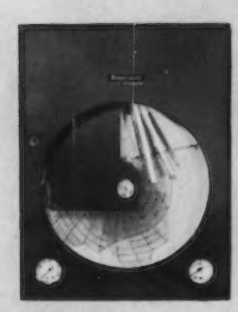
SHULER & BENNINGHOFEN, HAMILTON, OHIO



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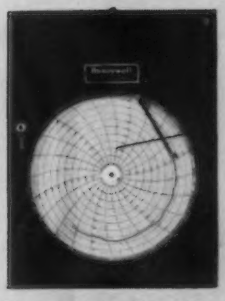

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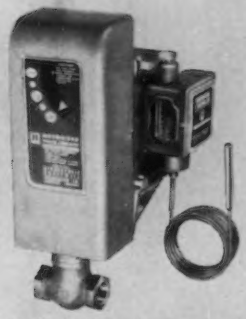

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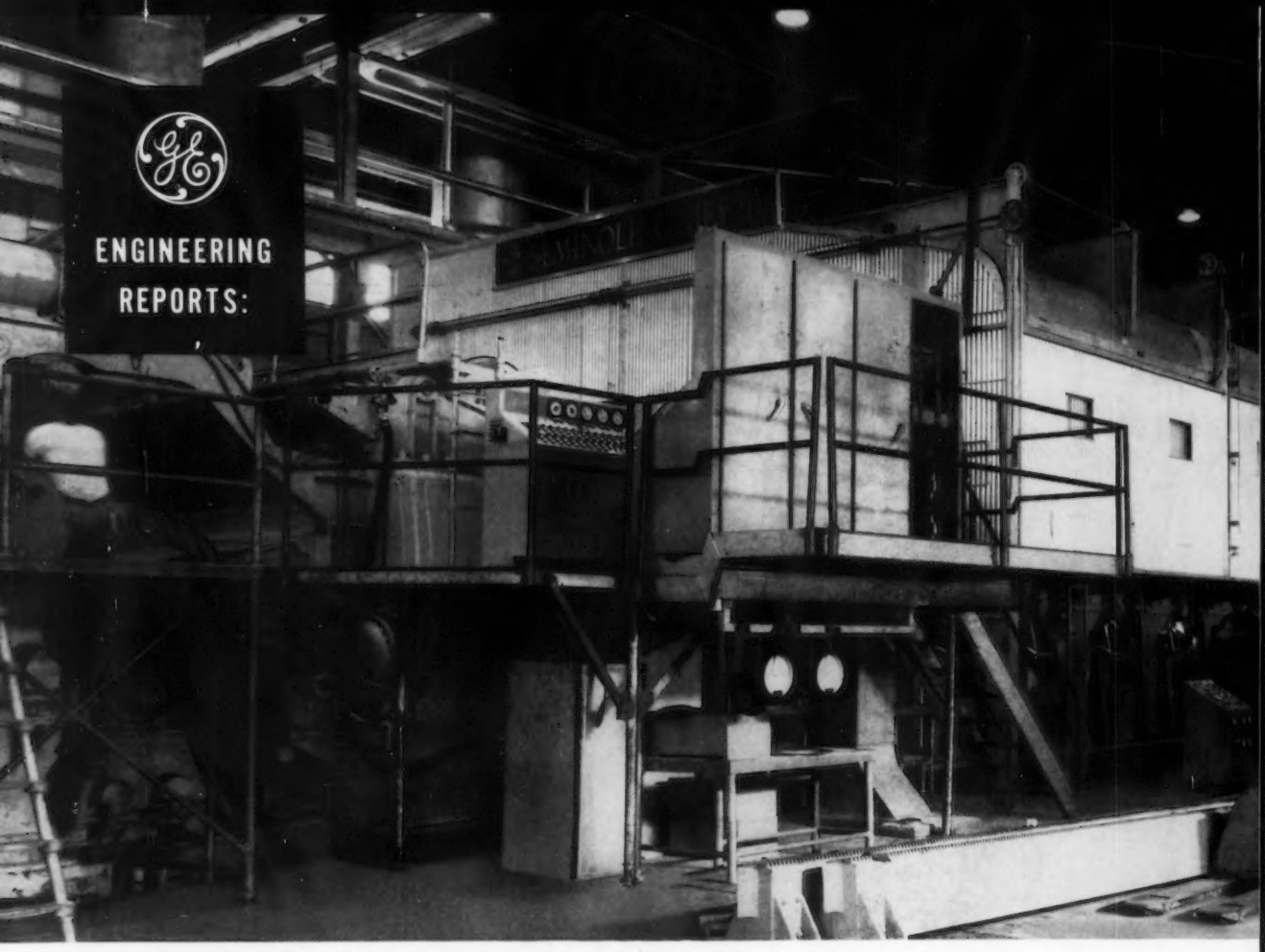


GENERAL ELECTRIC HELPER DRIVE SYSTEM POWERS . . .

World's biggest kraft board

New "Seminole Chief" adds 1000 ton-per-day capacity to St. Regis' Jacksonville, Fla., mill

PLANNING ELECTRICAL EQUIPMENT requirements for mill are (L-R): G. E. Shaad and J. B. Peebles, Jr., both of General Electric Co.; and L. C. Crowder, Chief Engr., O. A. Smith, Staff Engr., and J. A. McDermott, Gen. Mgr. of Pulp and Paper Production, all of St. Regis Paper Co.

The huge new paper machine with a rated capacity of 1000 tons per day is now operating at the St. Regis Paper Company's Jacksonville, Florida mill. Part of an expansion begun two years ago, the newest and largest kraft board machine in the world manufactures paperboard used primarily to make corrugated containers. Known as the "Seminole Chief," the new Fourdrinier machine built by Beloit Iron Works is designed for speeds up to 2500 feet per minute.

Electrical Equipment furnished by General Electric for the mill expansion includes the electrical helper drive and the world's largest regenerative tension winder drive for the machine rewinder. Featuring static regulators self-contained in the control line-up, the helper drive supplies a total of 990 horsepower distributed over 12 motors applied to wet and dry end sections. Accurate control of machine operation is achieved by regulation of current, voltage or speed, based on individual section requirements. The factory-wired static regulators allow a savings in installation time and space, as well as a reduction in rotating equipment maintenance.

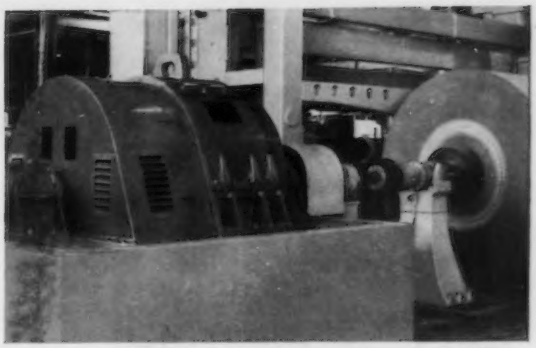
machine

The Winder Drive can accelerate or decelerate in approximately ½ minute, can stop in emergencies in 15 seconds. A 500-hp direct-coupled braking generator operates over a mill roll build-down range of 4:1, controls sheet tension to a preset value from 2½ to 11½ pounds per inch of width. Two 400-hp motors power windup stand at speeds up to 6500 feet per minute. Operator's console permits complete control of rewinding operation, requires minimum of operator attention.

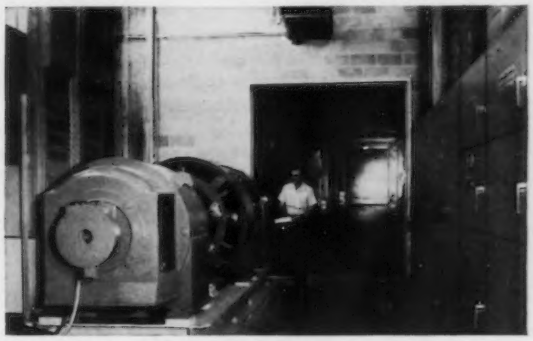
Co-ordination of equipment into a flexible, easy-to-maintain electrical system—designed to meet the special needs of this mill—was the result of close cooperation between St. Regis and General Electric engineers. Whatever your drive requirements, G-E engineering services are ready to help design, equip, and install a co-ordinated electrical system from one-line diagram to on-time startup. Simply contact your nearest General Electric Apparatus Sales Office for more information on paper mill drive systems. Or write for bulletin GEA-6508, Drive Systems for Pulp and Paper Mills, General Electric Company, Section 655-21, Schenectady 5, New York.

Engineered Electrical Systems for the Paper Industry

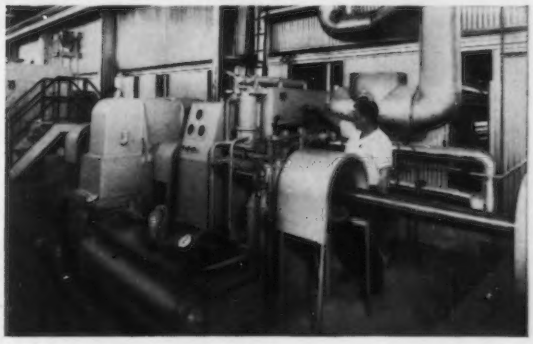
GENERAL ELECTRIC



WORLD'S LARGEST regenerative tension winder drive has 500-hp direct-coupled braking generator, two 400-hp windup motors to power winder up to 6500 feet per minute.



MAIN M-G SET for winder drive is rated 400 KW. Installation was simplified by use of high capacity busway to interconnect elements of winder drive.



MECHANICAL-DRIVE TURBINE, rated 3600 hp, provides speed regulation of .1% for mechanical line shaft drive.

30,000 KW TURBINE-GENERATOR increases mill's total generating capacity to 53,000 KVA, is tied to present distribution system permitting shift in steam or load between existing and new equipment.

Paper Production and Capacity Survey

Morris C. Dobrow

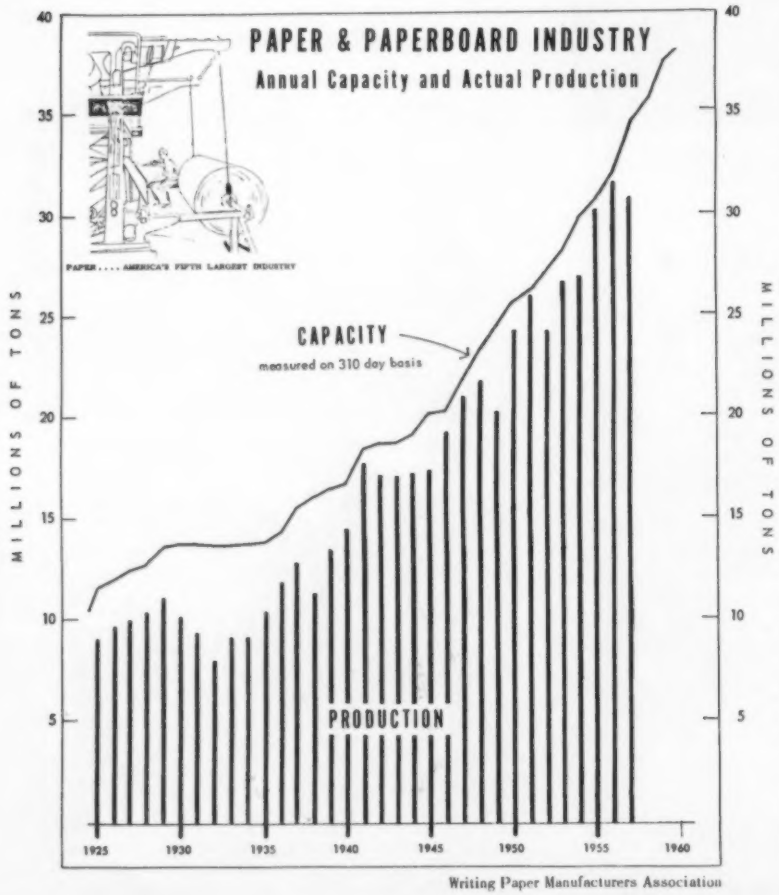
Executive Secretary

Writing Paper Manufacturers Association

There now is general recognition that the country is in a business recession. This became evident with the beginning of the 4th quarter of 1957.

The launching of the Russian satellites and other evidences of the beginning of a new arms race have aroused apprehension throughout the country as to the position of the U. S. as the leading world power. The successful launching of our "Explorer" has returned some measure of confidence. However, this has not lessened the urgency of meeting Russia's challenge to us for the military, political and economic leadership of the world.

These events have raised for the new Congressional sessions many problems that were not openly considered when Congress adjourned last summer. Highly important debate, consideration and action on these matters are indicated for the months ahead. Practically everyone of the 96 Senators and 430 Congressmen is more acutely concerned over the country's ability to protect itself than at any post-war session. The vast majority also are increasingly apprehensive over the business decline.



Writing Paper Manufacturers Association

The Business Recession

As for the business recession, many are asking—how did we get here—how deep is it likely to go—and how long will it last?

The years 1955 and 1956, particularly 1956, were abnormally good years. The public's consumption of practically everything increased faster than it normally does and beyond anything that was expected before the 1960's. Encouraged by this demand and also by the rosy prospects for 1960, most industries expanded their facilities at twice the normal rate of growth. The pressure on the capital goods industries intensified the boom. Total demand was beyond actual production. As a consequence, inflation developed and the Federal Reserve Board stepped in with its restrictive policies to halt the expansion and inflation before they got out of hand.

There was no growth in 1957. Business was about as good as it was in 1956. The first real signs of a recession appeared in the 4th quarter of 1957. It is not likely to be of long duration—probably 9 to 12 months from October 1st of last year.

Reasons for Optimism

This expectation is based on the following points:

1. The Federal Reserve Board took the first step to reverse its restrictive policy when it reduced the rediscount rate from three and one-half per cent to three per cent last November. Since then, the Federal Reserve Board has taken the second step in reducing the rediscount rate from three per cent to

two and three-quarter per cent. It also has reduced the margins required on security trading from 70 to 50 per cent. Further steps in liberalization of credit and reduction of interest rates are expected to be taken in the months ahead.

2. The building of new plant and equipment will be down this year by seven to ten per cent because there already is more capacity in industry generally than will be required in the next two years.

3. On the other hand, total construction, which includes housing, office buildings, roads, schools and other state projects—the total of all these construction items is expected to be somewhat higher than last year.

4. Government expenditures for defense, definitely, are going to be increased in the months ahead.

5. Astounding technical progress by Russia has alarmed the entire Western world. Both sides express the desire for peace and disarmament. Negotiations will be long and protracted. Furthermore, we cannot negotiate from weakness; we must negotiate from strength, so that the build-up of strategic and defensive programs must go forward at an ever-increasing pace.

6. Western unity and strength are dependent upon economic as well as military factors. A serious recession or depression is out of the question.

7. As soon as excess inventories are liquidated; as soon as there is a balance between production and demand, our industrial machine will be ready to go forward again. The consumption needs of our people are dynamic and this will be matched by increased production, particularly as we go forward into 1959 and 1960, when the first important effects of the war babies will be felt. The first crop of war babies was born in 1940 and they will be maturing into important consumers this year. A new wave of them will follow along each year and they will form a powerful, cumulative effect on increased demand for all kinds of goods throughout the next decade.

In the first 10 years after the war—1946 to 1956—U. S. population increased from 141,000,000 to 168,000,000, an average of 2,700,000 per year. In 1957, our population increased another 3,000,000—to 171,000,000.

Paper and Board Production

1957 was one of the years when the overall U. S. paper industry did not make a new high record. Overall industry production was down about 700,000 tons from the previous year.

In the first decade after the war, 1946-56, production each year exceeded the previous years, except in 1949 and 1952. In each of these years, production declined one and a half million tons from the previous year.

Paper production in 1957 was lower in each quarter than in the corresponding quarter of the previous year. This also was true for paperboard in the first and second quarters, but in the third and fourth quarters, paperboard production exceeded the corresponding quarters of 1956.

Overall industry production in 1957 was two per cent less than in 1956, the previous record year—two per cent higher than in 1955. For 1957, the paper grades were down three per cent from the previous year; paperboard was off about one per cent.

The present outlook for the industry is for a further decline in production in the first six or nine months of this year (as compared with the same months of 1957) with the expectations of an important gain in the 4th quarter of 1958. Tonnage for the year as a whole should be about the same as 1957.

Nothing much would be wrong with these figures if it were not for the fact that the capacity of the industry in 1957 was six per cent higher than in 1956. Moreover, another five per cent additional capacity is scheduled to come in 1958. This naturally widens the gap between potential supply and current demand. It lowers the operating ratio from over 100 per cent in parts of 1956 to a probable 85 per cent (of six-day capacity) in 1958.

Capacity Survey

We have just completed a new industry capacity survey based on programs completed or committed by all machinery manufacturers. Many mills

United States Capacity and Production by Grades

(Capacity—310-day basis)

Grade	1954 Capacity	1954 Actual Production	1954 %	1955 Capacity	1955 Actual Production	1955 %	1956 Capacity	1956 Actual Production	1956 %	1957 Preliminary Capacity	1957 Preliminary Actual Production	1957 Preliminary %
Fine Papers	1,377,000	1,284,526	93	1,401,000	1,451,727	104	1,500,000	1,594,798	106	1,576,000	1,545,000	98
Book and Groundwood Printing	3,720,000	3,587,360	96	3,852,000	3,935,055	102	4,013,000	4,278,494	107	4,176,000	4,028,000	96
Newsprint	1,280,000	1,202,413	94	1,409,000	1,459,017	104	1,610,000	1,620,146	101	1,812,000	1,804,000	100
Sanitary and Tissue	1,659,000	1,612,237	97	1,800,000	1,761,036	98	1,885,000	1,853,861	98	1,969,000	1,916,000	97
Wrapping and Packaging Papers	3,559,000	3,461,611	97	3,630,000	3,680,368	101	3,797,000	3,946,578	104	4,337,000	3,668,000	85
Special Industrial and Absorbent	630,000	500,525	79	630,000	609,852	97	662,000	682,504	103	694,000	634,000	91
Building Paper	1,450,000	1,428,349	99	1,561,000	1,586,098	102	1,567,000	1,429,021	91	1,573,000	1,286,000	82
TOTAL PAPER	**13,675,000**	**13,077,021**	**96**	**14,283,000**	**14,483,153**	**101**	**15,034,000**	**15,405,402**	**102**	**16,137,000**	**14,881,000**	**92**
Paperboard & Building Board	15,674,000	13,799,221	88	16,246,000	15,670,443	96	16,868,000	16,022,753	95	17,565,000	15,819,000	90
TOTAL PAPER AND BOARD	**29,349,000**	**26,876,242**	**92**	**30,529,000**	**30,153,596**	**99**	**31,902,000**	**31,428,155**	**99**	**33,702,000**	**30,700,000**	**91**

completed their committed programs in 1957; others have stretched them out for completion in 1958-60.

At the beginning of 1955, capacity of the entire industry on a six-day basis was 30.5 million tons. This virtually was in exact balance with production. In 1955, 1956 and 1957 new machines and improvements in existing equipment increased the annual capacity of the industry by 5.1 million tons. Accordingly, we enter 1958 with an industry capacity of 35.6 million tons. If the production in 1958 should be the same as it was in 1957, it would mean average operations for the paper and paperboard industry of 85 per cent (on a six-day basis).

The survey showed further committed expansion to be installed in 1958 and 1959 of 2.3 million tons. This would bring the capacity of the industry at the beginning of 1960 to 37.9 million tons. If we have a resumption of the normal growth pattern, and particularly the increase in per capita consumption which was in such evidence from 1946 to 1955, the capacity of the industry now in existence, as well as that which is committed to come in in the next two years, would not be absorbed until 1962.

Fine Papers

Fine paper production in 1957 was three per cent less than in 1956 but six per cent higher than in 1955.

The decline in production and shipments during 1957 is believed to be largely a matter of inventory adjustment. A slight gain in Gross National Product for 1957 (price increases eliminated) and a slight gain in the production of non-durable goods indicate practically no change in fine paper consumption in 1957 from 1956. Distributors and buyers bought less than they did in 1956 because they wished to reduce their abnormal inventories which had been built up in the latter part of the boom in 1956.

With capacity of the fine paper industry in 1957 at 1,576,000 tons and actual production at 1,545,000 tons, this segment of the industry had average operations at 98 per cent, measured on a six-day basis. Capacity during 1957 was further increased by 71,000 tons.

Annual capacity increases expected to come in:-

In	1958	107,000 tons
	1959	85,000 "
	1960	30,000 "

As we enter 1958, the capacity of the fine paper industry is 1,647,000 tons. Presently-known projections will bring it to 1,869,000 tons by the end of 1960—a gain of 25 per cent since the beginning of 1956.

When the recession is over and the normal growth pattern is resumed, we may expect the capacity that is now in existence and the capacity committed for completion in the next three years to be fully absorbed by 1961-2.

Printing Papers

Printing paper production in 1957 declined six per cent from the year before. Uncoated printing papers declined twelve per cent; coated papers were three per cent higher than in 1956. In 1957, the printing paper industry operated at 96 per cent of capacity. Its capacity at the beginning of 1957 was 4,176,000 tons. Additions during 1957 amounted to 291,000 tons. Annual expected increases expected to come in:-

In	1958	276,000 tons
	1959	37,000 "
	1960	90,000 "

Merchants' Sales

The National Paper Trade Association's report of merchants' dollar sales of fine paper, which includes book, writing, bristols, cover and text papers, was one per cent less in 1957 than in 1956. However, their total 1957 dollar sales exceeded their 1955 sales by 12.5 per cent.

Wood Pulp

In 1957, the U. S. production of wood pulp was two per cent less than in the year before. Shipments to the domestic market were seven per cent less than a year ago. Exports were eighteen per cent higher. Total imports of wood pulp into the U. S. were nine per cent less in 1957 than the year before. Arrivals from Europe declined 31 per cent, while arrivals from Canada declined five per cent.

During 1957, six new market pulp mills came into operation on the North American Continent. Three additional ones are expected to start in the first half of 1958. These nine mills will add about one million new tons of market chemical pulp in three years. The total new capacity of these nine mills will add 21 per cent to the North American (domestic and Canadian) market pulp capacity. The difficulties of absorbing such additional tonnage are obvious. In a business recession such as we are experiencing, the converting mills' requirements show some decline. However, integrated mills (which normally purchase 40-50 per cent of the total market pulp supply) cut their purchases sharply in times of setback, relying more heavily on the pulp of their own manufacture. Also, integrated mills have been expanding their own captive pulp capacity.

In 1957 shipments of dissolving pulp to domestic and overseas users were 11 per cent higher than the year before. Despite this improvement, the growing use of man-made fibers in both textiles and tire-cord has raised questions about the future growth trends for dissolving pulp.

The unbalanced pulp picture has been a heavy cloud overhanging the entire paper industry. The situation was alleviated to a considerable extent by the temporary delay in the completion of several of the new mills.

The other factor temporarily alleviating the situation was the protracted strike in British Columbia. All pulp and paper mills in British Columbia ceased operation on November 14, 1957. Production was not resumed until February 4, 1958. This meant a loss of about 180,000 tons of market and captive pulp and 150,000 tons of newsprint.

Summary

In 1958, all eyes are on Washington. What will the Administration and Congress do with the Defense Program? What will Washington do about the increase in unemployment?

1958 surely will be a year of more labor troubles, with difficult wage negotiations and probably many more strikes than in 1957. 1958 will also see many political changes in both domestic and foreign affairs.

For industry in general, 1958 will be a highly competitive year. More than ever before, manufacturers' interests will be centered on cutting costs, improving efficiency, and turning out products designed and priced to attract the customer. For industry in general, 1958 will be a year that will reward those with initiative as well as those who are creative and aggressive.

Consumer operations—how much is bought and where dollars are channeled—will be the most dynamic factors in 1958. Distribution, merchandising, all phases of marketing—will become more important than ever. To do these things, industries, distributors and retailers will need to use more paper, more effectively.

In the paper industry we have a much more competitive situation because of a substantial increase in capacity and practically no increase in demand for the products during 1957; nor is any change expected in 1958.

Maladjustments develop during a boom — recessions have a way of straightening them out. Recovery is inherent in our system because we have an ever-growing population that is dynamic in its wants and dynamic in its ability to produce.

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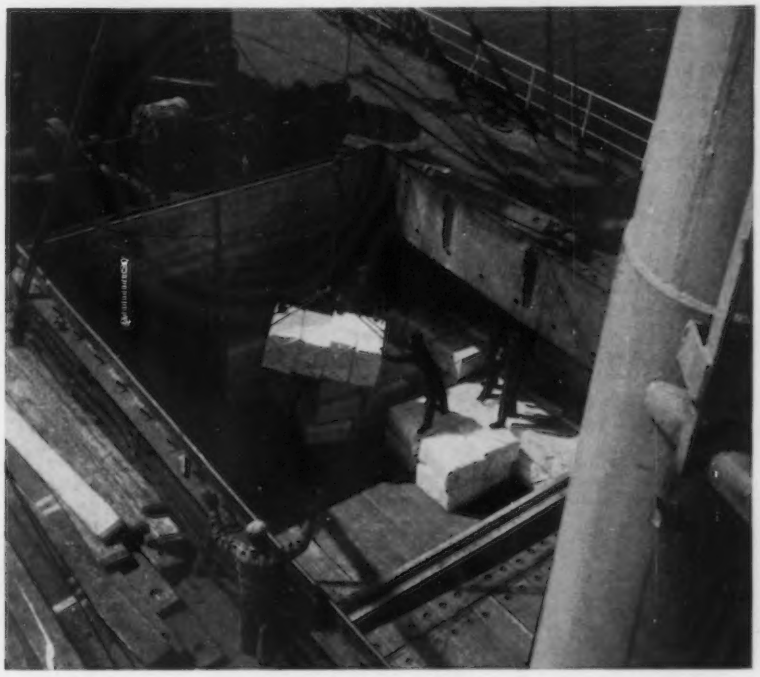
BALES OF GASPESIA BLEACHED SULPHITE PULP for export are loaded into the hold of a 10,000-ton ocean-going vessel.



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At Gaspesia we enjoy many natural advantages. Northern spruce and balsam fir—slow-growing, long-fibered, best for sulphite pulp—are the sole sources of the pulp you receive from us. Our access to nearly a million acres of these fine trees assures you a dependable, top-quality supply.

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Gaspesia pulp has earned endorsement for many uses—*from papeteries to boxboard to tissues*. Among its characteristics: high opacity, high brightness, good strength, excellent bulk and trouble-free working properties.

Location on the Gaspé Coast, within easy reach of waterways to the whole world, affords low-cost water transportation, practically ice-free, to nearly every major market area. Shipping time to Europe is about half that from our Pacific Coast. Transcontinental rail systems speedily deliver carload quantities to both the United States and Canadian markets.

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PRICES OF FIBERS

MARKET WOOD PULP

FIRST QUARTER CONTRACT PRICES PER SHORT AIR-DRY TON

	Delivered Pasis				
	U.S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$82.50/ 90.00	$82.50/ 90.00	§$90.00/ —	§$90.00/ —	§$90.00/ —
Bleached Gw'd.	$97.50/100.00	$97.50/100.00			
Kraft, Blchd.	157.00/ —	160.00/162.50	$157.00/162.50*		$157.50/ —
Kraft, Blchd. Hdwd.	152.00/ —		$137.00/ —		
Kraft, Semi-bleached	140.00/ —	140.00/ —			
Kraft, Unbl.	117.50/125.00	125.00/130.00	†125.00/130.00	125.00/ —	
Sulphite, Blchd.	155.00/ —	155.00/ —	*155.00/ —	*155.00/ —	155.00/ —
Sulphite Bl. Hdwd.	150.00/ —				
Sulphite, Unblchd.	135.00/ —	135.00/ —	†135.00/ —	*130.00/ —	
Sulphite, Unb'l. Gl'sn		134.00/ —	†134.00/ —		
Soda, Blchd.	147.00/150.00	150.00/ —			

§ On Dock Atlantic Ports. * Freight allowed. † Varying Freight Allowances

NEW YORK RAG MARKET

New Domestic Cotton Cuttings

Delivered Mill Basis
PRICES NOMINAL

	Per 100 lbs.
No. 1 White Shirts	$13.50/$15.00
No. 1 Unblchd. Muslins	16.50/ 17.50
Blchd. & Unblchd. Underwears	16.00/ 17.25
No. 1 Light Silesias	6.75/ 7.25
No. 1 Light Blue Overalls	7.00/ 7.50
Percales	6.00/ 6.50
No. 1 Light Prints	5.00/ 5.25
Suntan Khakis	6.00/ 7.00
Cottonades	3.00/ 3.50
No. 1 Washables	2.50/ 2.75

Old Domestic Cotton Rags

(Prices to Dealers, f.o.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$3.00/$3.25
Cotton Pants & Overalls	2.00/ 2.25
Twos and Blues, Repacked	1.50/ 1.75
No. 2 Roofing	.50/ .60

COTTON LINTERS

Memphis Market

f.o.b. Oilmills

Week Ended February 14		For 100 lbs.
Grade 1 n.a.		
2		$9.50/ $9.25
3	1 cut—felting	8.50/ 8.00
4		7.75/ 7.00
5		6.75/ 6.25
6		6.00/ 5.50
7		5.25/ 5.00

*Based on 73% cellulose.

Old Rope & Bagging

(Prices to Dealers, f.o.b. N.Y.)

	Per 100 lbs.
New Burlap Cuts	$4.50/$5.50
Scrap Burlap	3.50/ 4.25
Australian Wool Pouches	5.00/ 5.75
Gunny	4.75/ 5.00
No. 1 Domestic Manila Rope	6.25/ 7.50
No. 1 Foreign Manila Rope	5.25/ 6.25
Domestic Sisal Strings	4.00/ 4.50

WASTE PAPER MARKET

Mill Prices, f.o.b. Trucks Shipping Point — Includes Brokerage

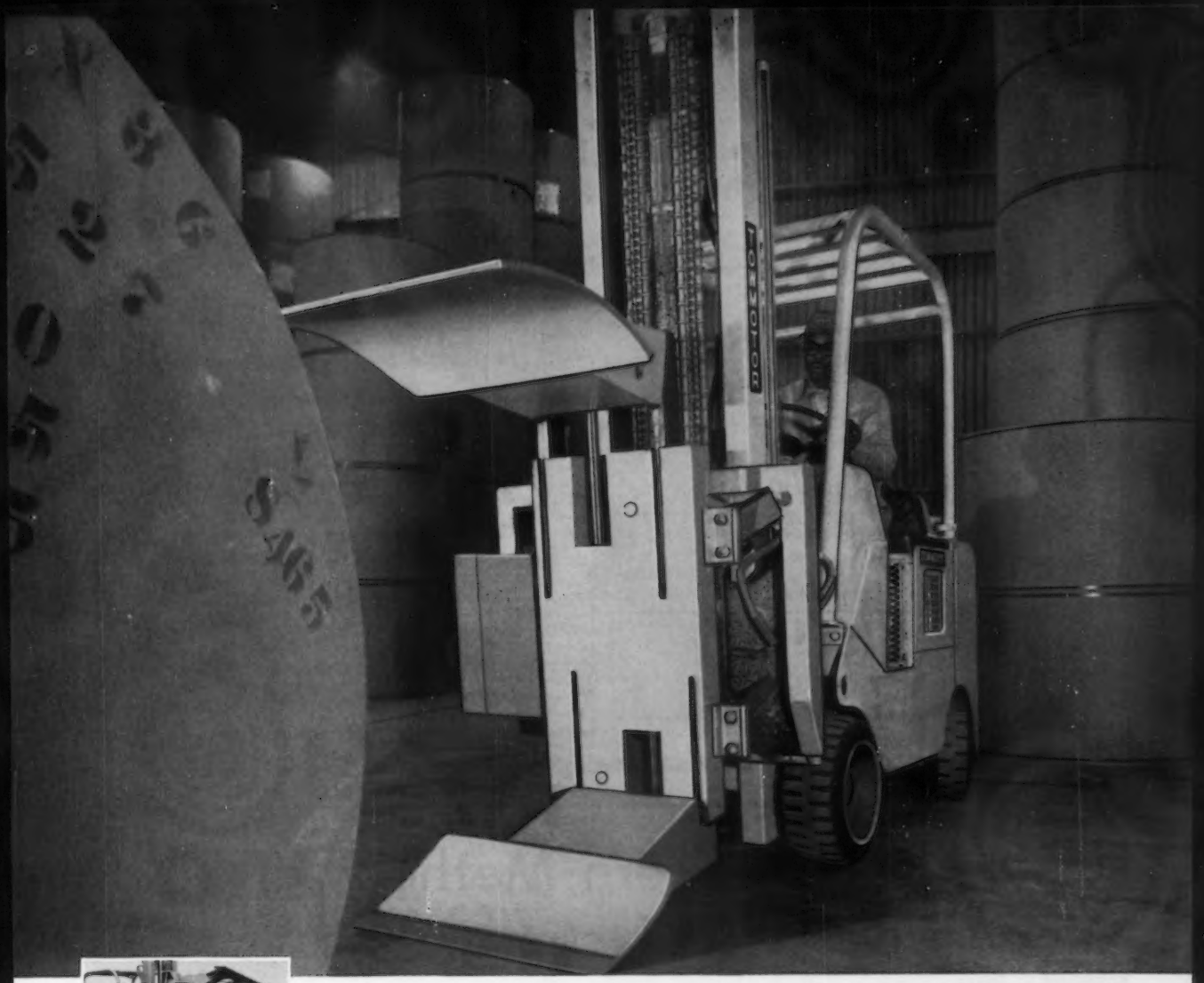
These quotations are a partial indication of the price range on volume tonnage in each market on the date specified, as gathered from major dealers. SPECIAL PACKINGS AND SPOT TONNAGE NOT INCLUDED. Prices nominal.

	New York	Boston	Chicago	Los Angeles
	February 17	February 17	February 17	February 17
No. 1 Mixed Paper	$5.00/ $8.00	5.00/ 7.00	4.00/ —	12.00/ —
No. 1 News	13.00/ 15.00	14.00/ —	16.00/ —	12.00/ —
Overissue News (Lg. size)	16.00/ 18.00	11.00/ 14.00	21.00/ —	16.00/ —
Mill Wrappers	11.00/ 13.00	12.00/ 14.00	7.00/ —	13.00/ —
Old Corrugated Containers	21.00/ 22.00	20.50/ 21.00	20.00/ —	20.00/ —
Super Resorted Kraft Paper	30.00/ 35.00	35.00/ 42.50	35.00/ —	45.00/ —
New Double Kr. Ld. Corr. Cuts	25.00/ 30.00	32.50/ —	32.50/ —	30.00/ —
(Semi-chem. medium)	40.00/ 45.00	37.50/ 45.00	40.00/ 45.00	35.00/ 45.00
New 100% Kraft Corr. Cuts	50.00/ 55.00	50.00/ 55.00	55.00/ —	45.00/ —
New Br. Kraft, Env. Cuts	65.00/ 70.00	70.00/ 75.00	55.00/ —	50.00/ 55.00
New Br. Kr. Bag Waste Prntd.	55.00/ 60.00	55.00/ 60.00	50.00/ —	45.00/ 50.00
New Br. Kr. Bag Waste Unprintd	60.00/ 65.00	65.00/ 75.00	65.00/ —	45.00/ 50.00
No. 1 Groundwood Shvs.	25.00/ 30.00	24.00/ 30.00	16.00/ —	25.00/ 30.00
White Newsblanks	50.00/ 55.00	50.00/ 57.50	35.00/ —	55.00/ —
No. 1 Soft White Shvs.	55.00/ 60.00	60.00/ 65.00	55.00/ —	— / —
Super Soft White Shvs.	65.00/ 75.00	75.00/ 85.00	65.00/ —	— / —
Hd. White Shvs.	90.00/ 95.00	100.00/110.00	90.00/ —	85.00/ 90.00
Hd. White Env. Cuts	115.00/125.00	120.00/130.00	100.00/ —	100.00/110.00
Col. Tab. Cards	50.00/ 60.00	55.00/ 62.00	47.50/ —	37.50/ —
Manila Tab. Cards	60.00/ 70.00	70.00/ 75.00	65.00/ —	75.00/ —
No. 1 Col. Ledger	28.00/ 33.00	30.00/ 32.50	40 00/ —	20.00/ —
White Ledger	45.00/ 50.00	50.00/ 55.00	52.50/ —	35.00/ —
Mixed Book & Mag.†	18.00/ 19.00	19.00/ 20.00	12.00/ —	— / —
No. 1 Books‡	25.00/ 27.00	22.00/ 24.00	27.50/ —	— / —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood.

PRICES OF MATERIALS

Aluminum sulphate:			
coml. bulk, c.l. wks.	cwt.	2.00	/ —
iron-free, c.l. wks.	cwt.	3.55	/ —
Casein, acid prec.:			
dom. sh. pt. c.l. (30 mesh)	cwt.	56.00	/ —
Arg. ex. dock	cwt.	20.75	/21.50
New Zealand	cwt.	24.00	/25.00
Caustic soda:			
c.l. wks. solid, 76%	cwt.	4.30	/ —
flak. & grd. drums, c.l.	cwt.	4.70	/ —
liquid 50% tanks		2.90	/
liquid 73% tanks		3.00	/ —
China Clay			
dom., dry-grd., airfloat:			
325 mesh bgs., c.l. Geo.	ton	10.00	/ —
300 mesh, bgs., c.l. Geo.	ton	13.50	/14.50
imp., white, lump, c.l. ex. dock		20.00	/35.00
Chlorine:			
single-unit tanks, works	cwt.	3.15	/ —
multiple unit, 2-5 cars per yr.		5.25	/ 4.05
Lime:			
hydrated, bulk, c.l. N.Y.	ton	23.63	/ —
quicklime, bulk, c.l. N.Y.	ton	22.13	/ —
Gum rosin:			
K, M. N, drums, c.l. Savan,	cwt.	7.70	/ 7.80
Rosin size:			
70%, gum & pale paste, tank cars, south, sh. pt.	cwt.	7.38	/ 7.48
Saltcake:			
dom. bulk, 100% anh. wks.	ton	28.00	/ —
Soda ash:			
light, 58% ash bags, wks.	cwt.	1.85	/ —
bulk, c.l. wks.	cwt.	1.60	/ —
Sodium chlorate:			
drums, c.l., wks.	cwt.	9.00	/ —
drums, l.c.l., wks.	cwt.	9.50	/10.50
Sodium peroxide:			
dms., c.l. E. of Miss.	lb.	.20½	/ —
l.c.l. (same basis)		.21	/ .21½
Sodium silicate, 40° Be.:			
tank-cars, wks.	cwt.	1.20	/ —
drums, c.l. wks.	cwt.	1.55	/ —
47° Be. WW.			
tank-cars, c.l. wks.	cwt.	1.90	/ —
drums, c.l. wks.	cwt.	2.25	/ —
Soybean, protein:			
chem. isol., wks. c.l. bags	lb.	.23	/ —
Starches:			
Corn, multiwalls, c.l. prod. plant:			
pearl	cwt.	6.49	/ 6.75
white, dextrins	cwt.	8.08	/ 8.20
chlorinated	cwt.	8.25	/ 8.35
potato, Idaho, c.l. wks.	cwt.	6.35	/ —
East, fr. all. 50 cents cwt.			
potato, Maine, f.o.b. wks.	cwt.	6.25	/ —
Sulphuric acid:			
60° Be. cbys. c.l. wks.	cwt.	2.00	/ —
l.c.l. wks.	cwt.	2.45	/ —
tank-cars, wks.	ton	18.60	/ —
Sulphur:			
crude, c.l. mines, contract, long	ton	23.50	/ —
f.o.b. vessels Gulf dock	ton	25.00	/ —
Sulphur dioxide:			
liquid, coml. cyl., wks.	lb.	.10	/ .12
multi-unit cars, wks.	lb.	.0535/	—
Talc, fibrous grd., bags:			
c.l. wks., N.Y.	ton	28.00	/ —
l.c.l. wks., N.Y.	ton	31.00	/36.00
Titanium dioxide:			
anstase, c.l. dlvd. E. bags	lb.	.25½	/ —
l.c.l. dlvd.	lb.	.26½	/ —
rutile, c.l. dlvd.	lb.	.27½	/ —
l.c.l. dlvd.	lb.	.28½	/ —



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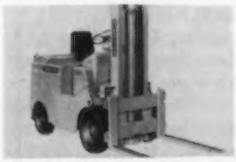

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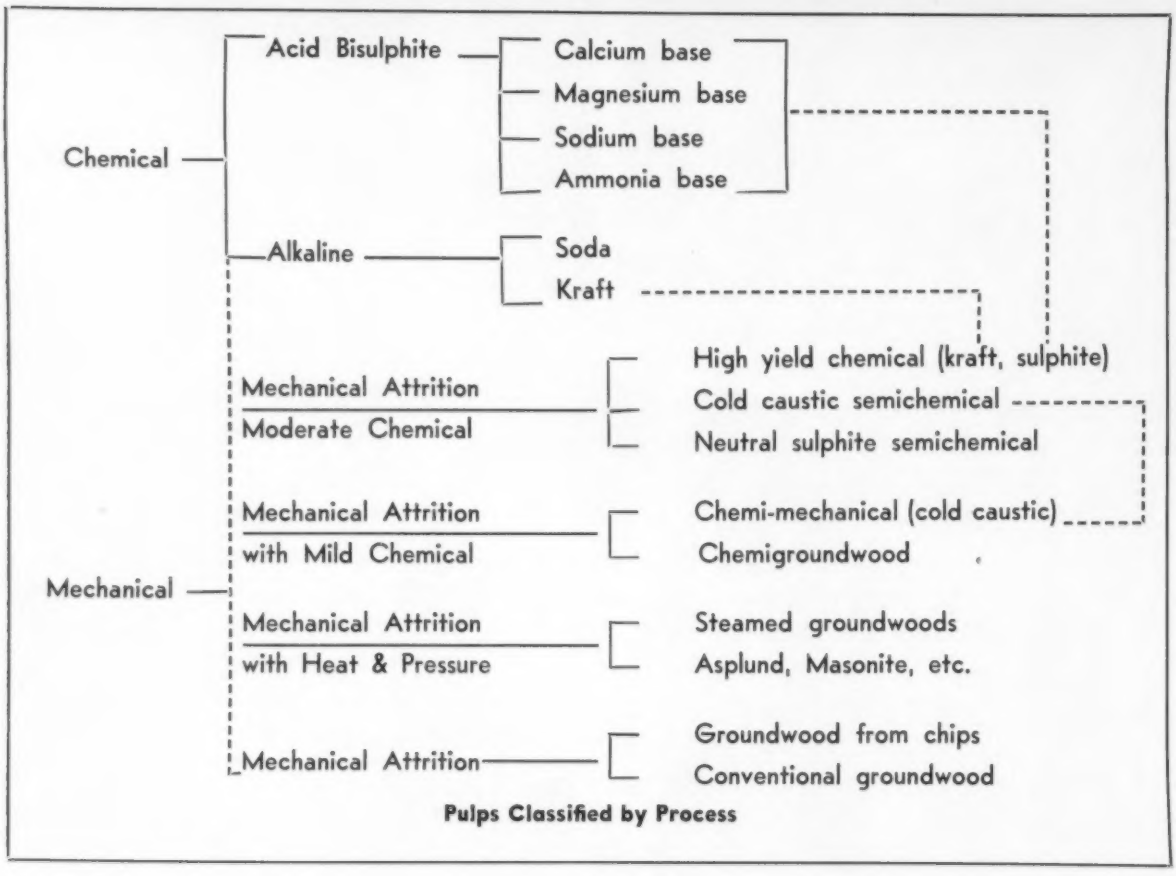


Pulps Classified by Process

A Survey of Modern Methods of Wood Pulp Manufacture

Raymond L. Janes
Assistant Professor
Department of Paper Technology, Western Michigan University

The time has passed when a pulping method could be classified simply as groundwood, sulphite, kraft, soda, or semichemical. Relatively recent developments have caused an overlapping of pulping processes necessitating an extension of the original meaning of these terms. This paper is an attempt to relate the pulping processes into an over-all perspective, with special emphasis being placed on the relatively recent processes. Some developments in continuous pulping and recent equipment will also be discussed.

Nature of Pulping

Pulping is the process whereby a fiberous raw material is treated to yield fibers or fiber-like elements which are capable of being bonded together during the normal papermaking process. This definition must be modified for the manufacture of high-alpha or dissolving pulps where the function of pulping is the production of fibers of high and controlled purity. The primary objective of pulping is to produce the highest possible yield of suitable fibers at the lowest possible cost.

Pulping is accomplished by various combinations of energy in the form of heat, chemicals, pressure, and mechanical attrition. The nature of the resultant fibrous products depends on the type(s), and the degree(s) of the above treatments. Thus, the commercially employed wood pulping processes may be classified as shown in Table 1.

It is evident that the greater the chemical and physico-chemical energy employed to weaken the interfiber bonds, the less mechanical energy needed to complete the fiber separation process and the lower the yield from a given quantity of wood. On the other hand, the greater the proportion of mechanical energy used, the more damage the fibers will undergo during separation

TABLE I—CLASSIFICATION OF WOOD PULPING PROCESSES ON BASIS OF FORMS OF ENERGY UTILIZED

A. Mechanical Attrition
1. Conventional Groundwood
2. Groundwood from Chips

B. Heat, Pressure, and Mechanical Attrition
1. Building Material Processes (Asplund, Masonite, Etc.)
2. Steamed Groundwood

C. Mild Chemical-Mechanical Attrition
1. Chemigroundwood
2. Chemi-Mechanical (cold caustic soda)

D. Moderate Chemical-Mechanical Attrition
1. Semichemical (neutral sulphite) (acid sulphite) (kraft) (soda)

E. Extensve Chemical
1. Chemical (sulphite) (kraft) (soda)

and the closer will be the chemical and morphological resemblance of the pulp to fiberized wood.

On this basis all wood pulping processes are a compromise between high vs. low yields, high vs. low purity, and high vs. low fiber damage during pulping. Groundwood pulp is on one end of the scale and the full chemical pulps on the other. Table II gives the normal yield range for the various processes. High yield chemical pulping processes (i.e. low yield semichemical processes) such as high-yield kraft and high-yield sulphite are sometimes in a yield range between those shown in Table II for semichemical and chemical pulp.

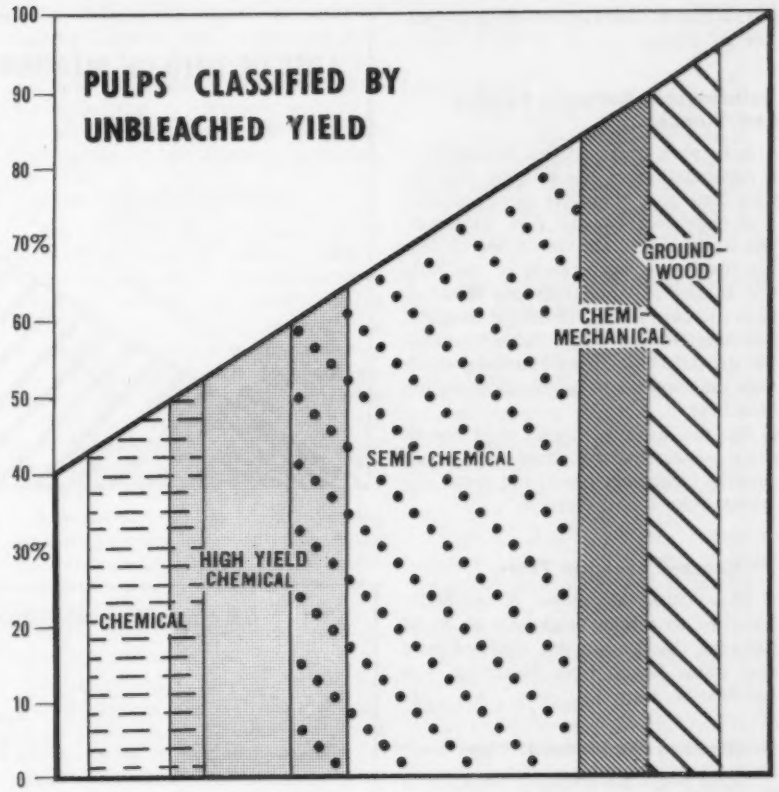
Relations Between Pulp Properties and Process

Pulp properties are dependent on 1) the amount and distribution of the various chemical constituents, 2) fiber morphology, and 3) shape and size distribution of the fibers.

In many instances the non-cellulosic fractions of a pulp are highly desirable. For example, lignin renders strength and stiffness to fibers; whereas hemicelluloses promote swelling and interfiber bonding and reduce power requirements for strength development. However, a high lignin concentration on fiber surfaces will reduce interfiber bonding. Also lignin content is directly related to bleaching cost and will, if not removed, reduce the brightness and color stability of the products. Too large a proportion of certain hemicelluloses leads to hardness and low opacity in paper, a tendency toward yellowing of white papers, and low drainage during pulp washing and paper forming. High hemicellulose and mineral contents are not tolerable in significant quantities in pulps used for rayon and acetate manufacture. Large quantities of extractives remaining in wood pulps are generally undesirable as they often lead to pitch and foam problems, bleaching difficulties, and color instability of bleached products.

The physical and morphological structure of pulp fibers depends directly on the process of isolation. The mechanical pulverizing of dry wood yields splinters and wood flour which can be bonded only through the use of resins, temperature, and pressure as done in hardboard manufacture. This inability for self-bonding is consequence of 1) the low magnitude of surface area, 2) the presence of encrustating substances, like lignin, and 3) improper particle size and shape distribution.

The groundwood processes accomplish fiberizing more efficiently, resulting in greater surface areas available for interfiber bonding and less fiber damage.



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The chemi-mechanical processes (e.g. cold caustic soda, Chemigroundwood, and steamed groundwood) yield more whole fibers and less debris and fiber bundles than the mechanical processes. Fiber separation is more readily accomplished as a result of the weakening of the lignin-hemicellulose bonding complex by mild chemical action.

The semichemical pulping processes combine partial dissolution and softening of the interfiber bonding material by more extensive chemical action. Mechanical fiber separation causes relatively little fiber damage.

The full chemical pulps are composed largely of whole fibers because the bond between them is chemically dissolved and no mechanical action is needed for separation.

The strength of papers made from all pulps depends on the interfiber bonding potential of the fibers and, to a lesser degree, on the strength of the fiber. High bonding potential in fibers is a complex function of:

1) Total surface areas available for bonding, 2) nature of the surface, 3) fiber flexibility, 4) length to width ratio of the fibers and 5) ability of the fibers to swell in water. Lignin contains a lower proportion of hydroxyl groups than cellulose and, when present on fiber surfaces, reduces the bonding potential of the fibers. This explains why pulps of the Asplund and Masonite type bond poorly unless heated and pressed, whereupon the lignin will soften and act as a bonding agent between fibers upon cooling.

It is common knowledge that certain hemicellulose fractions greatly enhance

TABLE II—YIELD RANGES OF WOOD PULPING PROCESSES

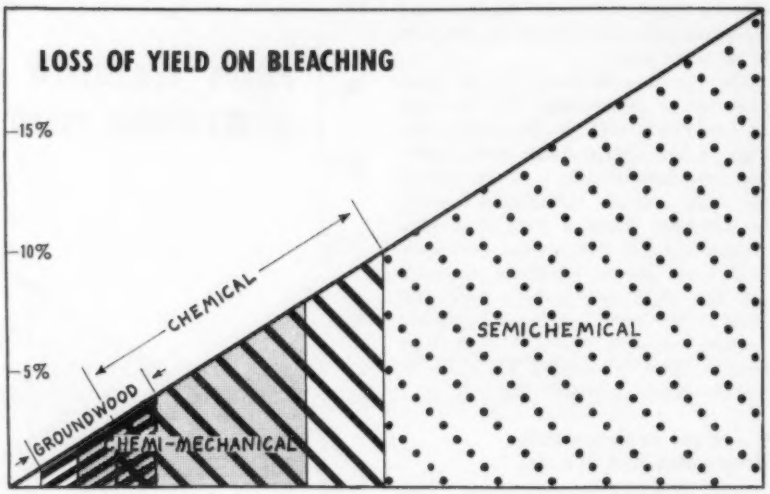
Processes	Unbleached Yield % of O.D. Wood
Groundwood, Building Material Pulp	90-96 (93)
Chemi-Mechanical, Chemigroundwood	85-90 (87)
Semichemical	60-85 (75)
Chemical	43-52 (48)

the surface bonding and swelling properties of fibers.

Relationship Between Pulping and Bleaching

It is often observed that bleaching is a continuation of the pulping process, with bleaching being the more selective and expensive of the two. However, this statement is valid only when bleaching involves a purification of the pulp (i.e. lignin, and hemicellulose removal) as is the case in full bleaching chemical and semichemical pulps. Table III classifies the pulp types as to bleaching yields and the degree of purification during bleaching.

On the basis of these yield values there appears to be three approaches to pulp bleaching, producing three different pulp types, namely:



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1—Bleached Chemical Pulps

This class of pulps is normally bleached to a high brightness of 80-90 per cent, resulting in low yields of pure and stable fibers. Here bleaching is a purification step.

2—Bleached Semichemical Pulps

These pulps are normally bleached to a 75-85 per cent brightness accompanied by a simultaneous purification to give a moderate yield of about 55 per cent. Semibleaching to a 65-70 per cent range entails a smaller loss in yield, but the lignin remains in the pulp. Because of the large amounts of lignin that must be removed in full bleaching, the bleaching losses are two to three times greater than for the chemical pulps and large quantities of bleaching reagents are required. However, higher yields result because the large hemicellulose fraction that is characteristic of semichemical pulps is largely preserved during bleaching.

3—Bleached Groundwood and Chemi-Mechanical Pulps

Bleaching of these pulps is carried out with a minimum of purification in order to preserve the high pulping yields. The brightnesses obtained are generally 65 to 72 per cent at a bleached yield of about 85 per cent. The brightness stability of these pulps cannot be expected to be as good as the more purified pulps, but it is satisfactory for the grades of paper normally made from these pulps.

TABLE III—BLEACHING YIELDS AND LOSSES OF WOOD PULPS

Processes	Bleached Yield, % of Original O.D. Wood	Normal Degree of Purification or Bleaching Loss, % of Original O.D. Wood
Groundwoods	89-93	1-3
Chemi-Mechanical	80-88	2-8
Semichemical	50-70	*10-20
Chemical	35-45	3-10

*(Semi-bleaching shows losses of only about 5%.)

Pulping Methods

Detailed descriptions of equipment or manufacturing procedures are outside of the intended scope of this paper. The emphasis will be on comparisons of the various processes used commercially and on recent developments. The order of discussion will be in the order of increasing unbleached pulp yields.

Chemical Pulping Processes

A description of these processes is unnecessary as the commercial practices are common knowledge. It should suffice to list the major advantages and disadvantages of each process.

Sulphite Pulping

Advantages:

1—Unbleached pulp is light in color.

2—Unbleached pulp is readily bleached.

3—Pulp is readily purified by alkali for use as pulp for chemical conversion.

4—Pulp strength is only medium but can be developed rapidly; finds wide use in greaseproof and glassine paper manufacture.

5—Fiber is very versatile and forms well.

6—Fiber low in lignin and hemicelluloses.

Disadvantages:

1—Cannot readily pulp species high in resins and certain extractives; sound logs are necessary.

2—Spent sulphite liquor recovery is still a headache, in spite of good progress along these lines in recent years.

3—Longer pulping time needed than for the kraft process.

4—Pitch in pulp is large problem.

5—Acid resistant digesters and lines required.

6—Is not generally suited for pulping hardwood species.

Only about three new sulphite mills have been built in the world in the past 10 or 15 years because of the wood species problem and the rise in the versatility of kraft and semichemical pulps.

Kraft Pulping

Advantages:

1—Can pulp any species of softwood or hardwood and can utilize cull wood and lumber mill scrap.

2—Paper strengths are highest of all chemical pulps.

3—Minimized stream pollution due

to excellent chemical recovery cycle.

4—Pulps can be bleached to high brightness and strengths.

5—Tall oil and turpentine are by-products.

6—Pulping reaction rapid and selective.

7—Pitch problems are non-existant.

Disadvantages:

1—Unbleached pulp very dark.

2—Bleaching requires more stages and chemicals than sulphite pulps.

3—Pulps are high in hemicellulose fraction which is resistant to alkaline purification of pulp for chemical uses. Acid prehydrolysis of chips prior to normal pulping and bleaching results in a fair rayon pulp.

4—Strength development requires considerable power.

5—Odor problem (is being solved).

Soda Pulping

This process is of minor importance today because yield and strength of fibers is much below that obtainable by the kraft process. The fiber is usually hardwood species, is soft, and finds use as printing paper filler to improve opacity, bulk, and formation.

Miscellaneous Reagents

Delignification can be accomplished by chemicals such as nitric acid, higher alcohols, glycols, phenols, and hydrotropic solvents. Many of these have promising features, but have not, as yet, proven themselves commercially. Research in this area should be encouraged and watched closely for future developments. An excellent survey of this area is given by Brounstein *(1)*.

Semichemical Pulping

All of the presently employed chemical pulping processes may be adjusted into the semichemical high yield range by reducing 1) the amounts of chemical applied, 2) the pulping time, and 3) the pulping temperature. Thus, the high-yield kraft, high-yield sulphite, and high-yield soda processes are semichemical. The most widely used semichemical method is the neutral sulphite (NSSC).

There are virtually as many different semichemical systems as there are installations, but they all have in common a mild chemical treatment of chips in pressure digesters followed by mechanical fiberizing. The trend is toward continuous operating cycles, which will be discussed in a later section. An excellent survey of various systems is given by Sapp *(2)*.

Yields in semichemical pulping are 10 to 40 per cent higher than chemical pulping because only about one-half of the lignin and one-third of the hemicellulose is removed from the wood during pulping, as compared with 90 to 98 per cent, and 60 to 80 per cent, respectively, in the chemical processes.

Neutral Sulphite Semichemical

The pulping reagent used is an aqueous solution of sodium sulphite containing sodium bicarbonate or other alkali as neutralizing agents. Pulping occurs on the slightly alkaline side where the alkalinity is not great enough to severely attack the hemicellulose fraction, and acid hydrolysis of carbohydrates is suppressed. The chemistry of the pulping reaction is thought to parallel the sulphite process (i.e. sulphonation and hydrolysis).

Low density and low lignin hardwood species generally produce better pulps than such dense woods as oak. Coniferous species are not widely used because they yield pulps of low comparative strength, high lignin content, and require more chemical and power.

Batch digesters may be either the globe-rotary or the vertical-stationary type. After cooking, liquor is drained off the chips in leach-casters or drain tanks. In recent installations, screw-presses are used to coarsely fiberize the chips and to press out and recover most of the liquor. Disk type refiners are most commonly employed for fiberizing and refining the chips, the trend being toward multi-stage, hot fiberizing. Power requirements are in the range of 15 to 30 h.p. days per ton, depending on species and yield.

Processes for the recovery of heat and chemicals from the spent liquor have now been commercially proven.

Hardwood NSSC pulps are characterized by strength comparable to coniferous sulphite pulps except for slightly lower tear and fold. Thus, hardwood fibers are successfully being employed to replace a large portion of the coniferous pulp in a wide variety of paper furnishes. Pulp strengths above 80 per cent yield are low, but increase steadily with decreasing yield to about 65 per cent. Yields in the range of 70 to 80 per cent are used in grades like corrugating medium, wrapping, and linerboard. If the pulp is to be bleached for use in bonds, tissues and glassines, unbleached yields in the range of 60 to 65 per cent are utilized.

Bleaching increases strength markedly as the removal of the lignin improves fiber surface properties, swelling, and flexibility. However, high bleaching costs and large bleaching losses for full bleached pulps often nullify the savings in wood costs.

A comparison of advantages and disadvantages will serve to summarize NSSC pulping.

Advantages:

1—High yields.

2—Well adapted for utilization of readily available and low cost hardwood species, and mixtures of them.

3—Unbleached brightness of some species is as high as unbleached sulphite.

4—Bleached pulp strength comparable to coniferous sulphite pulps.

5—Capital costs lower than chemical mills, and smaller plants are economic.

6—High stiffness is of value in grades like corrugating medium.

7—Strength development is rapid and requires little power. Well adapted to greaseproof and glassine paper manufacture.

8—A good substitute for coniferous sulphite in a wide variety of paper furnishes; promotes good formation.

Disadvantages:

1—Pulps tend to be shivey and dirty. Bauer-type cleaners have largely eliminated this problem.

2—Full-bleaching requires large amounts of chemical and severe reduction in pulp yields.

3—Papers utilizing large percentages are hard, "tinny," and of low opacity. Wet-web strength is low.

4—Pulps are generally slow draining on washers and paper machines.

5—Not well suited for coniferous species.

Kraft Semichemical

Several Southern kraft mills employ high-yield pulping techniques which can be classed as semichemical. These pulps are darker than NSSC pulp and normally have lower strength when hardwoods are used.

Coniferous species are more widely employed because 65 per cent yields of good liner board and corrugating medium are possible by modifying existing kraft chemical pulping operations.

The cooked chips are generally hot refined in disk type mills before the knotters and washers. Strength development takes place by refining after washing. Screw press treatment to initially fiberize chips and to recover a large proportion of the liquor, followed by disk refining is a recent trend. A balance between yield, power costs for fiberizing and strength development, and strength must be determined for each set of circumstances. The higher the lignin content, the more power that is needed to develop strength. For linerboard the most suitable yields lie in the 65 per cent range. Kraft semichemical pulps contain more lignin, less hemicellulose,

are darker than NSSC, and are slightly lower in strength.

Soda semichemical wood pulps are made only to a very limited extent, as the process produces low strength pulp of relatively high lignin content.

Acid Sulphite Semichemical

Canadian newsprint mills are attempting to produce more paper with less coniferous wood. This leads them into high-yield sulphite pulping of coniferous woods or normal pulping of certain hardwood species. Normal yield coniferous sulphite mills are being converted to high-yield pulping by modifying pulping conditions to yield chips at a 60 to 65 per cent yield. Normal sulphite digesters must be equipped with high pressure steam nozzles at the blow valves and lower cones to avoid chip hang-ups during blowing. The chips are fiberized in two stages with washing in between, requiring about 15 h.p. days/ton. Other installations employ Curlators for fiberizing and refining. The pulps appear to be satisfactory for newsprint manufacture in all important respects. However, much 316 stainless steel equipment is needed, the process is more complicated, and the high yields tend to intensify pitch problems.

Cooking cycles may be accelerated by the Va-Purge System, developed by the Pulp and Paper Research Institute of Canada, which increases the initial rate of liquor penetration into the chips through the use of alternating vacuum and pressure cycling of the chip-liquor system. This thorough penetration allows the remaining liquor to be withdrawn and the pulping to take place in the vapor phase.

Hardwood sulphite pulping is done to a small extent and used as a partial substitute for coniferous sulphite in newsprint manufacture.

Chemi-Mechanical Pulping

The distinction between semichemical and chemi-mechanical pulping is made on the basis of the fact that comparatively little dissolving of wood components occurs during chemi-mechanical pulping. The steamed groundwood pulps and the building material processes may also be considered in this class. In view of its importance today, cold caustic soda pulping will be stressed as the representative of chemi-mechanical pulping.

Chemigroundwood Process

The chemigroundwood process is a modified groundwood operation utilizing a mild chemical pretreatment of whole logs prior to conventional grinding. It was developed between 1946 and 1950 at the New York State College of Forestry as a means of utilizing Northeastern dense hardwoods which could not otherwise be converted to satisfactory groundwood pulp. The process was adapted for commercial operation at Great Northern Paper Co., East Millinocket, Maine, and in 1955 a 400-ton-per-day plant was installed to furnish a portion of the pulp for 900 tons per day of newsprint. This is the only mill using this process at the present time.

In its present form, the process consists of the following sequence of operations *(3,4)*:

1—Four-foot logs (aspen, birch and maple) are fed into a vertical digester by means of a rotary turntable.

2—A vacuum of 27-28 inches mercury is applied for 30 minutes; cooking liquor is added without breaking the vacuum. Pressure of 150 p.s.i.g. is applied by means of a centrifugal pump adding liquor. Heat is applied by an indirect heat exchanger in the circulation line.

3—Pulping conditions are essentially as follows:

a—Cooking liquor: 6 parts sodium sulphite and 1 part sodium bicarbonate at a concentration of 1.0-1.5 lb./gal. as sodium carbonate.
b—pH 9.5 to 9.0.
c—Total pressure: 150 p.s.i.g.
d—Time: 6 hours.
e—Temp.: 140-150°C.
f—Chemical consumption: 10-12%, on basis of O.D. wood.

4—At the completion of a cycle the cooking liquor is blown to an accumulator where it is fortified for reuse, and the entire bottom of the digester is opened hydraulically to drop the logs into a water pit. A grapple transfers the logs to a conveyor system leading to Great Northern waterous grinders.

5—Grinding is accomplished with ½ to 2/3 the power consumption of conventional groundwood at twice the production rate. Grinding temperatures and pressures are lower due to the softened nature of the logs.

6—The stock is then screened, Bauer-cleaned, thickened, and proportioned to the paper machine chest as a 20 to 40 per cent component of the newsprint furnish.

Unbleached Chemigroundwood pulps are in the range of 45 to 50 per cent brightness as compared to 55 to 60 per cent for spruce groundwood, but they may be bleached with 2 to 3 per cent sodium peroxide and acid pretreatment to 65 to 75 per cent. Hypochlorite bleaching employing excess alkali also appears to be satisfactory. At present, bleaching is not being practiced commercially.

Pulp strengths are two to four times as great as ordinary spruce groundwood. Sheets tend to be dense and low in opacity, however. The higher pulp strengths are largely due to a large whole fiber fraction, less fiber debris, and fewer fiber bundles.

Possible disadvantages may be cited. The cost of handling logs to the digester and to the grinder must be balanced against the cost of chipping and chip screening in the case of the other processes. Penetration of liquor throughout a log appears to be an unpredictable factor tending to cause non-uniformity of product. The six-hour pulping cycle is not attractive. The digester appears complicated in that the entire bottom must be opened and closed for each blow.

Cold Caustic

Cold caustic was used on straw more than a century ago, but since 1950 in the U.S., credit should be given to the U.S. Forest Products Laboratory, the Bauer Brothers Co. and Sprout Waldron Inc. for the commercial development of the cold caustic process as applied to wood *(5, 6, 7, 8, 9, 10, 11)*. The process essentially envolves 1) the steeping of wood chips in a 2 to 10 per cent sodium hydroxide solution for 1-2 hours at room conditions, and 2) fiberizing the chips in disk refiners, or a combination of screw presses followed by disk refiners. To improve the rate and uniformity of penetration, steeping may involve increased temperatures, air-evaculation of chips, hydrostatic pressures in the range of 150 p.s.i.g., special wetting agents, reduced chip size, or continuous operation utilizing a roller type mill where chips may be repeatedly compressed and decompressed in the pressence of the alkali. Another continuous technique is to apply the caustic during the initial fiberizing operation in a disk mill.

Some of the details of the operation and nature of the pulps can be summarized:

1—Most hardwood and mixed species can be used, although oaks are not too suitable. Conifers generally resist the treatment and result in coarse fibers of high yield and high power demand.

2—Chips consume 5 to 15 per cent sodium hydroxide based on the o.d. wood and yields are 85 to 90 per cent. Chemical consumption increases and yield decreases as the moisture content of the chips decreases.

3—Very little lignin or cellulose is removed, small amounts of hemicellulose and extractives are.

4—Strengths increase with decreasing yield.

5—Increased temperature during steeping darkens the pulp and decreases

the opacity of the bleached pulp. Optimum temperature appears to be 25°C.

Fiberizing and Refining:

1—Power demand is about one-half that of groundwood; 20-50 h.p. days per ton depending on species and conditions.

2—In contrast to groundwood, strength can be developed with controlled refining.

3—Screw presses before refiners can shred chips and press out about 70 per cent of contained liquor. This liquor can be fortified and reused in steeping. However, brightness and strength decrease and yield increases during recycling. After about 15 cycles the liquor must be disposed of because the high solids content inhibits pulping. *(12).*

Cleaning:

1—Normal screening followed by the Bauer-type of centrifugal cleaner is recommended. Pulp tends to be shivey and dirty unless carefully processed.

Bleaching:

1—The work of Smedberg and Stalter *(13)* should be refered to for a fine summary of present techniques.

2—Unbleached pulps are usually darker than normal groundwood.

3—Bleaching results vary widely depending on species, but brightnesses of 70 per cent are readily attained. However, opacity is reduced as brightness is increased.

4—Fresh pulps bleach more readily than aged.

5—Hypochlorite bleaching (10% chlorine) renders about 70 per cent brightness, but the pulp has a decidedly yellow cast.

6—The use of peroxide after the hypochlorite stage reduces yellowness. Various treatments using peroxide and hydrosulphite appear most promising.

7—Best results were obtained with the following sequence: Acidification, one per cent peroxide plus sodium tripolyphosphate, adjust pH to 6.0 with SO_2, and one per cent sodium hydrosulphite.

8—Bleaching losses range from 2 to 10 per cent.

9—Brightness stability appears to be relatively low because bleaching is not a purification process in this case.

Utilization and Properties:

1—Readily replaces both coniferous groundwood and some of coniferous chemical pulps in many printing grade papers.

2—In lower yields, satisfactory in corrugating medium and linerboard.

3—Cold soda pulps generally contain a lower fraction of coarse fibers and fines and have a higher average fiber length than do coniferous groundwood pulps. Pulp strengths and freeness are generally higher than groundwood.

4—The low amount of fines and high sheet density tend to make cold soda pulps low in opacity. Controlled disk refining tends to improve opacity through the production of fines *(11).*

5—Wet web strength is low.

In conclusion, cold caustic soda pulping appears to be a highly versatile, flexible, and economical process for the utilization of widely available hardwood species; to produce strong groundwood type pulps capable of substituting for a large proportion of both coniferous groundwood and chemical pulps in many grades which now employ such furnishes.

Special Processes for Building Materials

The special processes used for the manufacture of building material pulps utilize largely heat and mechanical energy to produce modified groundwood in yields slightly in excess of 90 per cent. Chemicals are seldom employed, the softening of the wood being accomplished in a matter of minutes by steam pressures and high temperatures. These pulps are not generally suited for the manufacture of paper because of their high surface lignin content, and coarseness of fiber. They are employed in such materials as hardboards, insulating boards, roofing felts, bulk fiber, and heat molded products.

In the Masonite process, chips are 1) fed into steel cylinders, 2) steamed at 350 p.s.i. for about 30 seconds, and 3) steamed at 1000 to 1200 p.s.i. for five seconds, 4) the chips are then released to atmospheric pressure by a quick acting valve and thereby explode because of their high internal pressure. The high temperature serves to soften the thermoplastic lignin bonding the fibers together, thereby allowing the fiber to separate readily. 5) The fibers are normally refined with disk type refiners. 6) The fibers are then normally formed on fourdrinier type of machines, and 7) pressed between polished steel plates at high temperatures to re-soften the lignin to cause interfiber bonding after cooling.

The Asplund process also relies on the thermoplastic behavior of lignin whereby mechanical separation of fiber takes place at 350 to 370°F. Chips are continuously fed by means of a screw-feed into a steam heated chamber at 140-175 p.s.i. Retention time is generally 50-75 seconds. Another screw-feeder forces the pre-heated chips into a twin disk Asplund defibrator. Refining takes place under pressure. The fibers are discharged by reciprocating valves or through a blow nozzle. The pulp is screened and refined if necessary. Power consumption is about 10 h.p. days/ton and steam demand is about 1700 lb./ton.

Asplund and Masonite pulps tend to be very dark in color and bleaching is not yet feasible. It might be interesting to further investigate the effect of mild pulping of such fibers, e.g. delignify after fiberizing. The amount of lignin surface exposed to the liquor are very high and the physical structure of chip no longer restricts penetration and diffusion, possibly allowing delignification to proceed much faster than in the case of normal chips.

Some work has been done in this area indicating that isolated damaged fibers are susceptible to severe degradation during pulping *(14).* Nolan, et. al., *(15),* however, has made good kraft pulps from hammermilled chips at accelerated rates by the use of high temperatures.

Many building material type processes merely pulverize wood by means of hammermills or may steam chips as they are being fed into disk refiners.

Groundwood Pulping

Conventional groundwood is made by forcing logs horizontally against a grindstone in the presence of water and pulp slurry. Being purely a mechanical process, the maximum possible yield is obtained from wood, but the separation of fibers is relatively poor as there is no pre-softening of the lignin-hemicellulose bond. Many fiber fragments and bundles result. Power consumption is in the range of 70 h.p. days/ton.

Hot-conventional grinding is often carried out at pit temperatures of 170°F. and is generally found to produce groundwood of higher strengths with a lower power consumption. The recent trend is toward increasing production by raising stone surface speeds up to 6000 f.p.m. and loading pressures up to 100 p.s.i., but results are non-conclusive.

Steamed groundwood pulping approaches chemigroundwood pulping with the exception that prior to grinding steam and/or hot water soaking of logs is employed, rather than chemicals. Steaming increases pulp strength markedly and reduces horsepower needed by allowing fibers to separate more readily, but generally results in a darker pulp and requires more labor.

Producing groundwood from chips is a fairly recent innovation, being commercialized by Bauer Bros. Co. *(7).* All species of wood that are commonly ground conventionally can be converted

to pulp by means of two-stage disk fiberizing in the presence of hot water. Softwoods that cannot normally be pulped by conventional grinding because of extractives, low brightness, or poor fiber quality can be pre-impregnated with sodium sulphite or caustic soda to yield fibers of relatively high quality.

The advantages appear to be 1) a wider range of control and flexibility of fiberizing, 2) 25-50 per cent higher tensile and tear strength, 3) a somewhat freer pulp, and 4) logs are not required. Power demand is about equal to conventional grinders.

We are all familiar with the basic properties of all groundwoods, namely: 1) relatively low strength, 2) excellent formation, opacity and bulk rendering an excellent inexpensive printing surface, and 3) brightness and color instability. It is widely employed in newspapers, book papers, coating raw stock, tissues, and molded pulp products.

Unbleached groundwood is 50-60 per cent brightness because heat and chemicals have not polymerized the lignins and tannins and formed colored derivative as in the case of chemical pulps. This brightness is sufficient for many grades and may be raised to 70-75 per cent by the use of peroxide, hydrosulphite, or alkaline hypochlorite bleaching. Color stability, however, remains poor.

Continuous Pulping Methods

The expansion of continuous pulping is inevitable. It is only a question of time before pulping will follow the course of papermaking, refining and bleaching operations which are already fully continuous in modern installations. The principles of continuous pulping are sound and valid, but the eventual complete adoption of these techniques depends upon continued development of mechanical designs to overcome the present difficulties.

The advantages and disadvantages of continuous pulping may be summarized as follows:

Advantages over Batch Pulping:

1—Control and flexibility of pulping is improved because of the small quantity of wood in the system at any given time.

2—Uniform relief and blowing facilitates more compact and efficient steam recovery systems.

3—Power, steam, liquor and chip demand is more uniform.

4—Reduced labor for filling, controlling, and operating.

5—Facilitates high yields and high rates of pulping.

6—Increased production because of time saved in filling and blowing.

7—Smaller physical plant needed for comparable tonnage, because yield per unit of digester volume is higher.

8—Lower liquor to wood ratio is possible resulting in steam savings.

9—Non-condensibles are continuously purged out of the system.

10—Corrosion is minimized by the absence of air, extreme temperature pockets, boiling, and expansion and contraction during heating and cooling of digester shells.

11—These processes lend themselves readily to chip pre-impregnation, purging, and vapor phase pulping.

Disadvantages over Batch Pulping:

1—More preventive maintenance is required because a breakdown in one part of the system may stop the entire production of the unit. In batch systems, the added production load can be redistributed to the remaining units.

2—The problem of continuous feeding of chips from storage into the high pressure zones of the digesters has not been completely solved. Screw feeders and rotary valves are all subject to serious mechanical failure caused by bearing problems, and jamming by oversize chips and/or fines. Discharge equipment on some systems is subject to considerable wear and plugging. All systems require the utmost in chip size uniformity. Recent designs have minimized these difficulties, and continued research will eventually eliminate them.

3—In *some* cases, the initial cost of a continuous digester system is higher than the equivalent tonnage in batch digesters.

4—Continuous systems are more complicated making excellent instrumentation a necessity.

5—It is felt by some that the shear and compression stresses applied to chips during feeding and conveying through the digester renders them more susceptible to degradation by pulping chemicals and high temperature. This can result in reduced pulp strengths. Further research on this phase is needed.

No attempt will be made here to describe in detail the various continuous digestion systems, only some of the basic features of some of the systems in use will be discussed.

Pandia Chemi-Pulper

The Pandia Chemi-pulper (Black Clawson Co.) is the most widely used continuous unit used in this country; about one million tons ranging from bleachable kraft and NSSC pulps to corrugating medium and hardboard.

A variable speed screw feeder continuously feeds wood chips or other material from an overhead hopper to the pressure zone of the digester. The screw compacts the chips to form a moving plug which serves to seal the high pressure side. Steam and pulping liquor spray onto the plug continuously as it leaves the throat of the feeder and drops to the reaction chamber. The reaction chamber consists of from one to six tubes stacked one above the other. The chips and liquor are conveyed through each of the tubes in series at a constant and controlled rate by means of screw-conveyors. The end of each tube feeds into the start of the tube below by means of a down-pipe. The last down-pipe feeds into a continuous discharger which uses digester pressure and an impeller *to feed to* an atmospheric pressure blow tank. The discharger valve is adjustable. The discharger action accomplishes a degree of fiberizing. Pulping temperatures are commonly 170—190°C. permitting accelerated pulping.

Kamyr Continuous Digester

The Kamyr digestion system makes use of rotary chip feeding valve, a long vertical digester and a scrapper-dilution system feeding a continuous blow system *(16, 17)*. Five of these units are now in operation on this continent making bleached and unbleached kraft pulp.

Chips are metered and fall into the pockets of a low pressure rotary feeder which drops the chips into a horizontal screw equipped steaming vessel operated at 12—15 p.s.i. Blow steam is used in the steaming vessel and serves to pre-heat and air-evacuate the chips. A special high-pressure rotary valve then feeds the chips from the steaming vessel into the top of the digester, utilizing high pressure liquor. The chips are deposited at the top of the digester onto screws equipped with strainers and fall on top of the chips in the digester. The chips slowly migrate downward through an impregnation zone and through two successive cooking zones. Each cooking zone has a girdle of strainer plates where liquor is removed, circulated through indirect heaters and fed back into the center of the digester in the upper part of each zone. White and black liquor is added continuously at the top of the digester and regulated according to rate of wood addition. Control of cooking is through control of the temperatures of the rotary valve circulation liquor, the liquor leaving each heating zone, leaving the heater, and at the bottom exit from the digester. The digester contents are maintained at a hydrostatic pressure of 165 p.s.i.g. to avoid boiling. Black liquor is injected near the bottom of the digester, the diluted pulp passes into a strainer, and exits from the strainer through an adjustable orifice and, to a small extent, through two alternating quick opening

valves. The strainer feeds into the blow tank through valves actuated by a variable speed drive.

The Kamyr type continuous digester appears to be favored for producing bleachable grades of pulps in contrast to high production corrugating medium and linerboard type pulps.

Grenco Continuous Digester

The Grenco digester of Bauer Bros. Co. is of the tube type utilizing screws and rotary valves for chip feeding and rotary valves between tubes and for pulp discharge. Paddle type rotors drive the chips through the tubes. This particular digester to date has been used largely for coarse pulp products. Generally, only one tube is used for tonnages up to 120 tons daily and units in parallel are recommended for higher tonnages.

Rapid Cycle Digester

The Bauer rapid cycle digester system *(18)*, initially developed by the U. S. Gypsum Co., is a compromise between continuous and batch pulping. The digester is a vertical stationary one of small capacity designed for rapid, automatically controlled pulping cycles using high temperatures and pressures and vapor phase pulping. Pulping is in reality an extremely rapid and automatic batch operation which appears to possess many of the advantages of continuous pulping. All types of pulp may be made and such treatments as pre-steaming, air-evacuation, and impregnation are readily accomplished. Chips are fed by means of large automatic sliding gate valves. Impregnation with liquor takes place and the excess blown from the digester by means of steam. Cooking occurs as rapidly as steam to 300 p.s.i. can be admitted. The blow valve is a large plug-type whose seat is steam cleaned. The chips are blown at low pressures into a blow tank.

Normal yields from 50—75 per cent are obtained in about 20 minutes. Because small batches and short times are used control and flexibility of the operation is excellent. Many variations in procedure are possible that are not practical in other types of digesters. High pressure pulping and the use of relatively large chip loading valves is being carried over into conventional batch operations with success.

These digesters are being employed for impregnation in the cold caustic pulping process.

Sprout-Waldron Continuous Digester

The writer is not very familiar with this recently developed digester the first unit of which went into operation at Sonoco Products Co. recently. Chips are presteamed and fed by rotary valve into a horizontal digester. The chips are conveyed continuously along perforated metal troughs where they are sprayed with cooking liquor. Retention time is about 40 minutes for a bleachable kraft pulp. The digester is divided enabling two different liquors and/or wood species to be used simultaneously. A second commercial unit is now being installed.

Editor's Note

Since the author completed this text two new commercial pulping developments have been announced (see *Paper Trade Journal* February 10, 1958). Both processes appear to be important modifications of sulphite acid pulping, adaptable to produce both semichemical and chemical pulps.

Continuous Cold Soda Pulping

Continuous pulping by the cold caustic soda process is getting out of the pilot plant stage at the Vita Mayer & Co. mill in Milano, Italy *(19)*. Pilot plant operations are being carried out at the U. S. Forest Products Laboratory *(9)*. Bauer rapid cycle digesters are installed at Gould Paper Co., Bowaters Southern Corp. and the Coosa River mill in Alabama.

The Forest Products Laboratory pilot plant utilizes a roller mill to compress and decompress chips continuously in the presence of liquor before a retention period followed by fiberizing in a double disk mill. The total power and chemical requirements of batch and continuous operation were about the same, whereas corrugating board strengths were slightly lower in the case of the continuous system.

The Vita Mayer operation feeds chips between two rolls of a cylindrical press to compress the chips and allows them to decompress and absorb liquor as they leave the nip. Three such pressers are used in series with the nip clearance decreasing step-wise. Total chip retention time in this system is 20—30 minutes. A pulp of increased softness is claimed to result.

Asplund Defibrator Process

This process has already been discussed in the under building material pulping processes. It appears that studies should be made in extending this process to the higher quality pulps of papermaking quality. Asplund equipment is being used for continuous NSSC pulping at several mills but these operations do not use the Asplund principle discussed earlier but typical tube digesters with screws similiar to the Pandia and Grenco units.

Conclusion

This paper has surveyed the broad field of the methods of pulp manufacture that are in use today, however, no claim for completeness is intended.

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Based on a paper presented at the Second Annual Pulp and Paper Conference held at Western Michigan University, January 23, 1958 (See Paper Trade Journal February 3, 1958).

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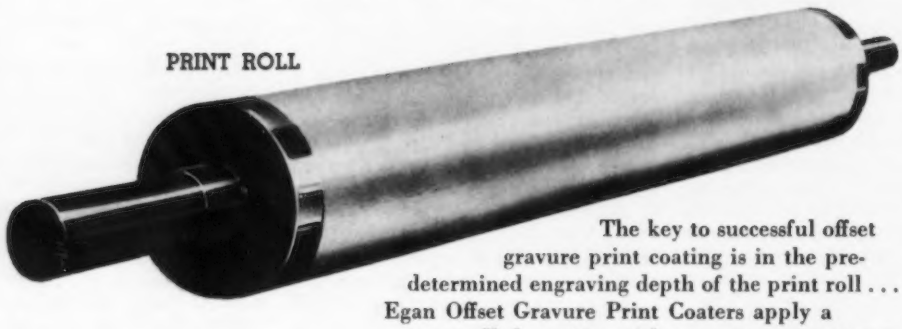

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INCREASED PRODUCTION - On no installation where the Poirier Syphon System is employed is machine speed determined by extraction limitations, crushing at the presses, etc. Increased production alone pays for the unit in a very short time.

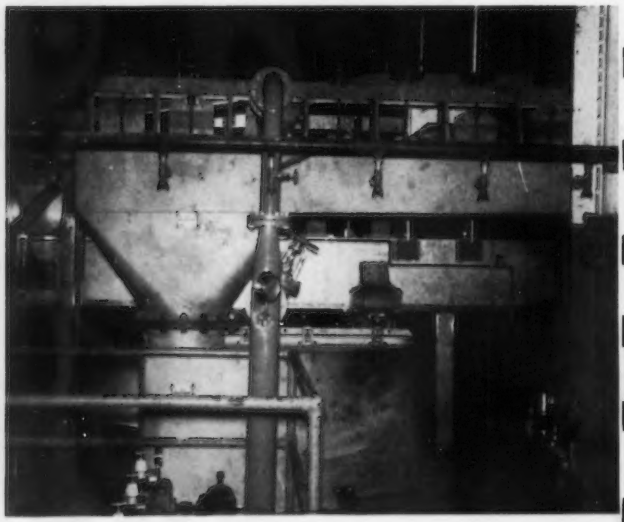
EXTENDED WIRE LIFE - The vacuum is automatic, pulsation free and properly applied. Without the excessive vacuum sliding friction is held to a bare minimum.

POWER SAVINGS - Costly large suction pumps are retired. Drag of wire over suction boxes is greatly reduced.

OPERATING CONSISTENCY Head box consistencies may be reduced to normal operating percentages since extraction capacity will automatically increase when a higher gallonage is delivered to the System.

SUPERIOR FORMATION - The proper amount of make-up water may be used with extraction assured. The vacuum is pulsation free and causes a smooth interweaving or matting of the fiber.

LOWER STEAM CONSUMPTION - Peaks are eliminated. The sheet leaves the wire with a uniform moisture content throughout.



Your requests for additional data and literature on all Poirier Equipment are welcomed. Without cost or obligation, one of our engineers will study your operation and furnish you with complete recommendations.

The POIRIER

AUTOMATIC FOURDRINIER FLAT SUCTION BOX EXTRACTION SYSTEMS

BAROMATIC SYPHON SYSTEM

MASTER SYPHON SYSTEM

UNIFORM DANDY EFFECT - Automatic operation assures that only the proper percentage of water remains in the sheet at the dandy regardless of variations in machine operation.

LONGER LIFE OF SUCTION BOX COVERS - The automatically controlled vacuum holds box cover to wire friction to a steady operating minimum.

REDUCED TWO SIDEDNESS EFFECT - The vacuum applied is smooth, not excessive, automatic, and pulsation free.

UNIFORM POROSITY Vacuum automatically increases and decreases with the seal over the suction boxes.

HIGHER RETENTION - The vacuum used is properly applied throughout the System, automatically rises and falls with variations at the wire and is at no time excessive.

WIRE LOCKING AND CHATTERING - The possibility of wire locking and chattering is greatly reduced; for vacuum capacity of the System is determined by the volume of water and air passed to the System from the sheet.

No Moving Parts — Maintenance Free — Easily Installed — Operating Automatically on all grades at speeds from 90 to 2000 F. P. M.

POIRIER CONTROL COMPANY

SPECIALISTS IN AUTOMATIC PULP STOCK AND VACUUM CONTROLLING EQUIPMENT

WATERVILLE, MAINE

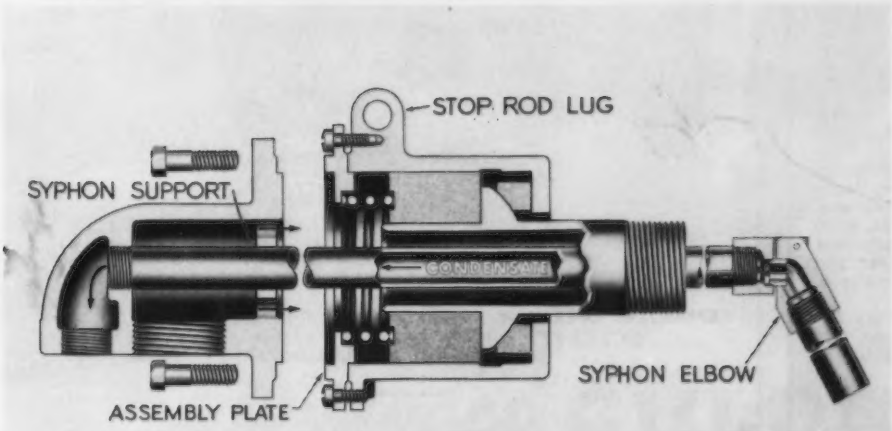
Everything the name implies –

...thanks to "Green Streak" Seal Rings and Ni-Chrome Plating

The new SUPER Type SDP Johnson Joint

The "Green Streak" seal rings are of a greatly improved structure—extremely hard and virtually non-porous. The Ni-Chrome plating—chromium on top of nickel—is done by a special process. Together, this combination makes possible a joint of unusually low friction characteristics and long life.

Test installations have already shown that this SUPER construction will out-perform and out-last anything of its kind. It is today's best answer for paper machines, calenders and corrugators where shut-downs are costly and operating pressures are on the rise.

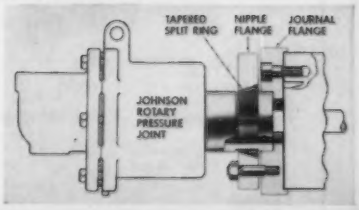


Type SDP SUPER Johnson Joint, which combines "Green Streak" rings and Ni-Chrome plated wearing surfaces for unusually long wearing, low friction characteristics. The Johnson Syphon Elbow, shown at right in picture, permits replacing unwieldy curved syphon pipes with two straight pipes; it hinges to pass right through joint, seats of its own weight when in position. Special assembly plate is provided to hold internal parts of joint in position when head is removed to get at syphon pipe.

Another Johnson Development . . .

THE QUICK-RELEASE NIPPLE

Eliminates a threaded nipple; utilizes powerful wedging action between nipple flange and tapered split ring to lock nipple securely in position. Greatly simplifies installation and removal — ends danger of damaging nipple with heavy wrenches. Available for all Johnson Joints.



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Rotary Pressure Joints • Direct Operated Solenoid Valves

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Name ..... Title .....
Company .....
Address .....
City ..... Zone... State.....

OBITUARIES

Raymond H. Weberg, 55, died February 10 in Kalamazoo, Mich. He was employed by Sutherland Paper Co. for 25 years, and was a foreman at the time of his death.

Alvin J. Stevens Jr., Co-manager of Carter Rice Storrs & Bement's, New Haven, Conn., division died at St. Raphael Hospital, New Haven, Conn., on February 4 after a short illness.

Thomas G. Webster, 67, for the past 37 years in the purchasing department of the International Envelope Corp., Dayton, Ohio, died recently in Miami Valley hospital after a sudden illness.

Bertram C. Hope, 69, died February 8 at Miami Valley Hospital, following a heart attack on the street. He retired as an engineer for the Sorg Paper Co. a year ago and moved to Dayton.

Figures of the Week

PAPER PRODUCTION RATIO REPORT—American Paper & Pulp Assn. Figures

(Production as percent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

1958	Jan. 11 88.7	Jan. 18 89.1	Jan. 25 89.1r	Feb. 1 85.4	Feb. 8 88.1
1957	Jan. 12 96.5	Jan. 19 97.0	Jan. 26 97.9	Feb. 2 96.5	Feb. 9 96.7

r Revised.

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1958	—	—	—	—	—	—	—	—	—	—	—	—	—
1957	94.2	97.0	97.1	94.0	94.6	93.3	75.6	90.7	86.0	93.0	90.7	81.4‡	90.9

‡ Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1951	1952	1953	1954	1955	1956	1957	1958
Year to Date	99.5	97.6	95.0	94.2	95.0	97.9	94.0	85.3
Year Average	98.0	88.6	92.3	91.6	94.0	97.9	90.9	

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available.

PAPERBOARD OPERATING RATIOS†—National Paperboard Ass'n.

COMPARATIVE WEEKLY SUMMARIES

1958	Jan. 11 88	Jan. 18 90	Jan. 25 87	Feb. 1 82	Feb. 8 83
1957	Jan. 12 97	Jan. 19 95	Jan. 26 96	Feb. 2 94	Feb. 9 94

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1958	—	—	—	—	—	—	—	—	—	—	—	—	—
1957	91	94	94	92	93	91	72	94	91	97	92	79	90

† *Percents of operation based on "Inch-Hours" reported on a 6-day basis.*

SUMMARY OF PAPERBOARD STATISTICS—National Paperboard Assn. Figures

ITEM	THIS WEEK ENDING Feb. 8, 1958 83%	LAST WEEK ENDING Feb. 1, 1958 82%	CUMULATIVE TO DATE Jan. 1 to Feb. 8, 1958 84%
	Tons	*Tons*	*Tons*
Total Production	251,516	244,049	1,372,756
Liner	72,966	70,958	429,716
Corrugating Material	36,776	35,101	206,210
Chip & Filler Board	4,234	3,367	20,467
Total Container Board	113,976	109,426	656,393
Folding	51,910	55,245	275,851
Set-Up	10,725	10,381	54,219
Special Food Board	24,713	25,229	125,169
Other	50,192	43,768	261,124
Total Boxboard	137,540	134,623	716,363
Total Orders	*Tons*	*Tons*	
Received	309,914	241,750	
Unfilled End of Week	395,797	340,841	

now there's more

Westvaco® CHLORINE

where it's needed . . . when it's needed!

More and more users throughout the industrial areas of the East, mid-South and Middle West now look to Westvaco as a dependable source of top-quality chlorine.

With its new cell rooms in full operation, our South Charleston, W. Va. plant is the newest chlorine facility in the industry. Output is greatly expanded. Contract or spot shipments can be made promptly in tank cars. We are fully competitive on service, price and quality anywhere in the 25-state area shown above, give or take a reasonable distance.

Why not give us a chance to prove what we can do for you? You'll be glad you did!

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Corrosion got you on the hook?

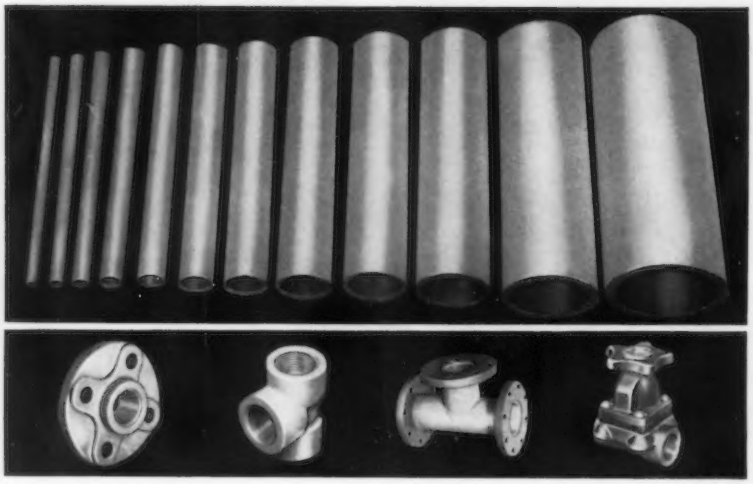
INVESTIGATE

Van-Cor

PIPE, FITTINGS, VALVES

made of Rigid, Unplasticized

POLYVINYL CHLORIDE



ADVANTAGES:

Resists Corrosion of Hundreds of Industrial Acids & Alkalies
Light in Weight (½ that of Aluminum)
Easily Installed; High Tensile Strength; Low Flow Resistance
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TWO TYPES:

1. Chemical Resistant, NORMAL Impact (Van-Cor 1)
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AVAILABLE FORMS:

Pipe: ¼" thru 12" diam. (10 or 20 ft. lengths)
Fittings: ¼" thru 12"
Valves: ½" thru 3"
Sheets: 1/16" thru 2" (48" x 96")
Bar Stock: ¼" thru 2" (10 ft. lengths)
Custom Fabrications
Custom Extrusions

Request Complete Catalog containing detailed specifications, diagrams, flow charts, chemical resistance tables and installation data.

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COLONIAL PLASTICS MFG. CO.
Subsidiary of THE VAN DORN IRON WORKS CO.
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NEW LITERATURE

EBERBACH LABORATORY APPARATUS. (Catalog 57G) Contains over 250 items including laboratory shakers, rotators, air pumps, etc., with complete descriptions and illustrations. **Eberbach Corp.,** P. O. Box 63, Ann Arbor, Mich.

ELWELL-PARKER MODEL F-38T3 ELECTRIC-POWERED FORK TRUCK. (4p Folder) Includes detailed specifications, plus design and application information. **Elwell-Parker Electric Co.,** 4205 St. Clair Ave., Cleveland 3, Ohio.

FALK ALL-STEEL SHAFT MOUNTED DRIVES. (Bulletin 7100) Includes description of unit design and construction; suggestions on using shaft mounted drives to solve various application problems, plus 2 pages of installation pictures. **Falk Corp., Dept. 255,** 3001 W. Canal St., Milwaukee 1, Wis.

FIRE PROTECTION SERVICE PLAN. (Brochure) Points out how a company can do a complete job of protecting itself against damaging fire loss. Also explains other "plus" services available to users of Ansul equipment. **J. R. West, Technical Service Director, Ansul Chemical Co.,** Marinette, Wis.

LAWSON HI-SPEED MULTIPLE HEAD DRILL. (4p Folder) Contains illustrated sales copy and specifications. **Lawson Co.,** 426 West 33rd St., New York 1, N. Y.

NOW—ACCURATE ALIGNMENT CONTROL. (Bulletin) Describes how this floating roll guide controls lateral alignment more accurately than ever before possible, and explains how this development saves time, money, and material. **Mount Hope Machinery Co.,** 15 5th St., Taunton, Mass.

PURE AND SIMPLE. (Motion Picture) Details practical solutions to the problems of industrial waste and water conservation. This film has a running time of 19-minutes and is available on letterhead request for free showing to companies or sanitary engineering organizations concerned with industrial waste problems. **Public Relations Dept., Link-Belt Co.,** Prudential Plaza, Chicago 1, Ill.

ROTARY AIR COMPRESSORS. (Brochure) Explains principle of operation with cutaway diagrams, describes special features, and details operating and mounting specifications. **Dept. A, American Brake Shoe Co.,** 530 5th Ave., New York 36, N. Y.

STATIC SPEED CONTROL FOR PAPER MACHINES. (Bulletin GEA-6275A) Discusses static speed control for paper machines, stressing the high accuracy, low drift, and high speed of reponse of this equipment. Also includes features and a simplified diagram of a static excitation circuit for a paper machine section. **General Electric Co.,** One River Rd., Schenectady 5, N. Y.

PULP TODAY...PAPER TOMORROW

To produce quality pulp for quality papers, Weyerhaeuser stresses rigid control throughout the mill.

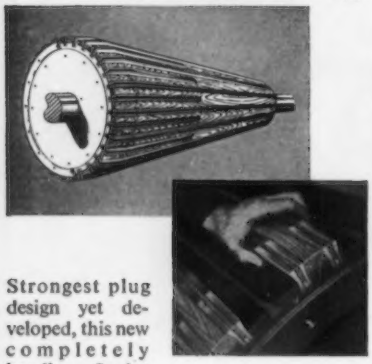
For instance, at our Everett Kraft Pulp Mill, 131 readings, tests and reports are made on process variables every hour.

And before it is baled and shipped, the finished pulp is subjected to ten major control studies. No effort is spared to make Weyerhaeuser pulp a consistently pure and uniform product that paper-makers can and do rely on.

WEYERHAEUSER

TIME FOR REPLACEMENT?

ED Jones® Adapta-Plug



Strongest plug design yet developed, this new completely bandless Jordan plug is easiest to strip and fill. New, improved design holds bars firmly in place, eliminates hazards of slot wear and corrosion. Available in solid plug — or sleeve form for easy conversion of old worn plugs. Write for Bulletin EDJ-1094.

ED Jones®

FULBAR

SHELL FILLINGS

A complete one-piece assembly, made to fit the shell body of any Jordan. No keys or wedges. Fulbar rigidity and one-piece construction compensate for inequalities in old Jordan shells — save hours of installation time. Many other new advantages make this the ideal shell filling. Write for Bulletin EDJ-1094 and names of satisfied users.

E. D. JONES & SONS COMPANY

Pittsfield, Massachusetts

Builders of Quality Stock Preparation Machinery

In Canada: The Alexander Fleck, Ltd., Ottawa

NEWS OF SUPPLIERS

D. E. Lamon
Appleton

H. K. Abramson
Appleton

Appleton Machine Co. has announced the promotion of two men to new positions, D. E. Lamon has been appointed chief engineer and H. K. Abramson sales office manager.

Mr. Lamon succeeds H. L. Wendshuh who has retired. He joined Appleton Machine in 1947 as an engineer, and has acted as assistant chief engineer since 1952.

Before joining Appleton Machine in 1956 as assistant to the manager of sales engineering, Mr. Abramson was with Central States Engineering and AZCO, Inc.

F. Marsic
Am. Potash

H. DeArmond
Am. Potash

American Potash & Chemical Corp. has elected Frederick Marsic and Henry DeArmond assistant secretary. The officers were named following the election of Richard J. Hefler, formerly company secretary and assistant to the president, as vice president in charge of finance.

Mr. Marsic, formerly assistant secretary, retains his other positions as assistant treasurer and office manager at company headquarters at Los Angeles. Mr. DeArmond was administrative assistant prior to his present appointment.

Morningstar-Paisley Inc.'s two major acquisitions during recent months have brought about a number of significant additions in it's line of starch, resin, and chemical offerings to the paper industry. Through the acquisition of Haberland Manufacturing Co. late last year, Morningstar became a manufacturer of pregelatinized starches, cold-water-soluble products that require no cooking. At the same time, Morningstar acquired Federal Adhesives Corp., together with its affiliates, whose plastisols are used in the paper industry.

C. C. Landegger
Black-Clawson

J. H. Reid
Bauer Bros.

Black-Clawson Co. has Carl C. Landegger to the post of assistant general manager of the Paper Machine Division, Watertown, N. Y. Mr. Landegger will make his office in the Watertown plant and work closely with the general manager of the Division, Otto W. Hein.

Mr. Landegger's latest assignment was Director Superintendente of Companhia Federal de Fundicao in Rio de Janeiro, Brazil. This firm operates a foundry and machine shop in Rio for the manufacture of Black-Clawson pulp and paper mill machinery for consumption in South America. He is a director of the Black-Clawson Co. and a vice president of Parsons & Whittemore Inc.

Bauer Bros. Co. has named Jack H. Reid sales representative in the Southern territory, pulp and paper mill equipment division. His headquarters are 908 Montford Avenue, Charlotte, N. C.

Prior to joining Bauer, Reid was a sales representative for American Cyanamid Co. Previously, he was quality control supervisor for the National Gypsum Co.

Cleveland Fuel Equipment Co. has changed it name to Cleveland Controls, Inc. The new name was selected, according to N. F. Hahn, president, as being more thoroughly descriptive of the type and character of new products and plans, some of which are completed, while others are in the development state.

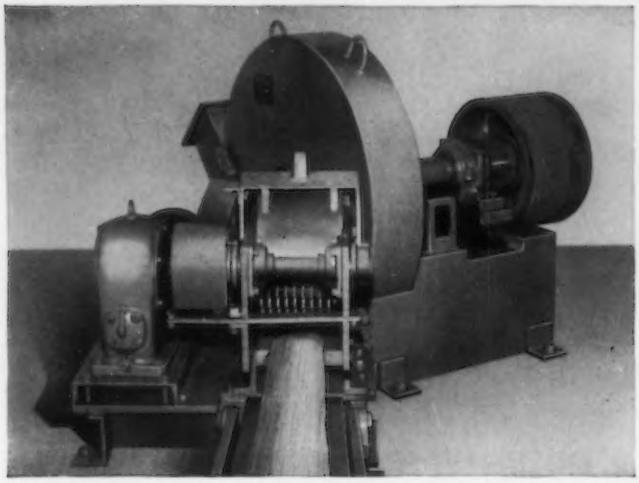
IT'S WHITE

Bauerite groundwood type pulp from hardwoods, bleached to a new whiteness, offers new applications . . . new economies . . . new profits. Where can you use it?

The Bauerite process makes economical, high quality groundwood type pulp from softwoods, too. Send for details.

THE BAUER BROS. CO.
BURT AND SHERIDAN
SPRINGFIELD, OHIO

Uniform, Clean-Cut Chips from "Waste" Wood



Carthage Slab Chipper

You get high-quality chips from slabs, edgings and small rounds, hard or soft wood, with a Carthage 39" Slap Chipper. With power feed synchronized with the cutting speed, this new chipper produces uniform, clean-cut chips which are exceptionally free from bruising.

Horizontal feed spout simplifies handling of long slabs and permits "automated" chipping when fed by the discharge conveyor from the Carthage Slab Barker.

Heavy feed fingers at the disc hold down and align short ends. Safety bar prevents entrance of oversize material. Feed stops automatically if spout is accidentally jammed. Capacity 3 to 5 cords per hour.

Write for Bulletin 39-1

●

Complete the Job with a Carthage Slab Barker and a Carthage-Dillon Chip Screen.

Ask Your Carthage Representative

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CARTHAGE
MACHINE COMPANY CARTHAGE, NEW YORK

R. Leighton

W. H. Mardo

S. J. Budowle

E. Schabloski

Stowe-Woodward Inc. has announced the retirement of Ralph Leighton as technical service manager after 27 years of service. A recognized authority on rubber rolls in the paper industry, he will stay on as a part time consultant.

William H. Mordo has been named to succeed Mr. Leighton as technical service manager at the home office in Newton Upper Falls, Mass. Named to succeed Mr. Mordo as plant manager in Neenah, Wis. is Samuel J. Budowle, senior chemist in charge of process control.

Earl Schabloski will fill the newly-created position of sales office manager at the Neenah plant, with responsibilities of sales follow-up and customer contact.

B. Mayo
Link-Belt

E. T. Mobley
CIBA

Link-Belt Co. has appointed Bruce Mayo as district manager of its Birmingham, Ala. district office. He replaces J. Ross Arnold who has been appointed to handle a special assignment at the Link-Belt plant at Colmar, Pa.

CIBA announces that E. Taylor Mobley has been named to its southern district managerial post. In May Mr. Taylor joined CIBA's sales division in Charlotte.

Ink smear test on sample sheets of Watervliet book paper shows that they're clean, strong and have just the right absorbency.

Stainless Steel Pipe stops shutdowns

at Watervliet Paper Company, Watervliet, Michigan

Before they installed Stainless Steel pipes, it took a lot of extra work to make clean book paper at Watervliet. Sodium sulfite, chlorine, caustic soda and other materials corroded the original pipes. They had to stop production periodically and flush out the pipes with a high pressure spray head and hose. It was a waste of production time and man hours.

But they don't lose a minute now because the new Stainless Steel pipes resist corrosion, so they stay clean. And they will last years longer because of Stainless Steel's unsurpassed corrosion resistance.

If you want longer service and less maintenance with your plant equipment, build it with Stainless Steel. And specify USS Stainless Steel for service-tested quality.

USS is a registered trademark.

USS **United States Steel**

Biggs Boiler Works Co., Akron, Ohio, has been acquired as a wholly owned subsidiary by the Union Spring & Manufacturing Co., New Kensington, Pa.

The Biggs Company, established in 1887, is a steel fabricator, manufacturing all types of pressure vessels as well as special fabricated steel and alloy plate work for the rubber, paper, chemical and process industries.

The purchase is part of Union's diversification program and will mean the joining together of Union's steel foundry and the Bigg's steel fabricating facilities. T. F. Krizanek, Vice President of Sales for the past four years, will remain in that position under the new arrangement.

The new subsidiary will be operated under the name of The Biggs Steel Foundry & Fabricating Co., with the present management.

Zimel-Salvadore Corp. has been formed by Harry Zinel, John E. Biery and Patrick F. Salvadore, former associates of the late Frederick L. Smith, consultant to the paper industry located at 21 East 40th St., New York City. The new firm will carry on the consulting business formerly conducted by Mr. Smith and will have offices at 117 Liberty St. in New York City. All records and drawings pertaining to the projects supervised by the late Mr. Smith are available at 117 Liberty St.

K. W. Smith
Improved Mach.

L. P. Moore
N. A. Cyanamid

Improved Machinery Inc. has elected Kent W. Smith vice president. He has been treasurer and a director of the company since 1949. Succeeding Mr. Smith as treasurer is Allan M. Barker. Gilbert Bucknam becomes comptroller and assistant treasurer.

North American Cyanamid Ltd., wholly-owned Canadian subsidiary of American Cyanamid Co. has elected Dr. L. P. Moore to succeed F. S. Washburn as president.

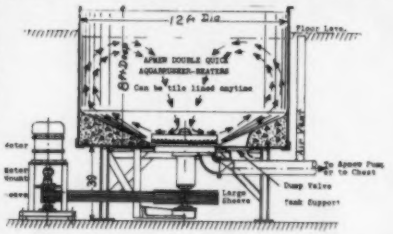
Dr. Moore, who has been assistant general manager of Cyanamid's Plastics and Resins Division, will maintain his headquarters in Canada and will be in charge of all of Cyanamid's Canadian activities. He has been associated with the parent company since 1934 in a number of different capacities.

Mr. Washburn will devote full time to responsibilities as general manager of Cyanamid's phosphates and nitrogen section.

REPEAT ORDERING, APMEW UNIVERSAL PAPER PULP MILL for FREE CHINA, that PRODUCES HIGH QUALITY, STRONG LONG FIBRED PULP, like SULPHITE, with HALF THE USUAL PRODUCTION COSTS, SO AUTOMATICALLY SIMPLE AND COMPACT THAT IN 100 TONS DAILY CAPACITY, IT CAN BE PLACED ON NEW YORK STATE CANAL BARGE AND BE PORTABLE, CAN BE OPERATED BY SEVEN SCHOOL BOYS A SHIFT, AND CAN BE ERECTED BY 10 MEN IN 15 WEEKS AT HALF THE USUAL MILL COST. USES 4% OF THE POWER OF USUAL GROUNDWOOD MILL PRODUCING STRONG LONG FIBRES (like SULPHITE) MECHANICAL PULP, the OTHER 96% POWER IS MADE INTO PROFITABLE HYDRO-ELECTRIC POWER.

NEWSPRINT AND BOOK PAPER OF DOUBLE STRENGTH CAN BE MADE WITHOUT SULPHITE FROM APMEW LONGFIBRED MECHANICAL PULP, OR FROM APMEW LONGFIBRED CHEMICAL PULP AT HALF THE PRESENT PULP PRODUCTION COSTS.

USES THE SAME DEPENDABLE APMEW MACHINES used in 437 APMEW CLEAN STOCK PREPARATION SYSTEMS, used in 128 APMEW DE-INKING SYSTEMS, used in APMEW (GARBAGE & SEWAGE) FERTILIZER COMPOST MILLS. OBSERVE IT. 367 PATENTS. QUICK DELIVERIES.



APMEW, INC., P. O. BOX 1, GLENS FALLS, N. Y.

At Private Sale

THE VERY DESIRABLE

INDUSTRIAL REAL ESTATE

Including Rights To A Large Supply Of
Excellent Water—Suitable For Processing Purposes of the

GLENLYON PRINT WORKS

Division of Sayles Finishing Plants, Inc. in Phillipsdale, East Providence, Rhode Island

425,000 SQ. FT. OF FLOOR SPACE of which
ABOUT 270,000 SQ. FT. IS FIRST FLOOR SPACE ON TWO LEVELS

Direct Loading and Unloading to and from Cars. Extensive Frontage on Seekonk River. Process Water up to 4,000,000 Gals. Daily. 23 Acres of Land.

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New steam-detergent gun packs a cleaning wallop

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Here is a steam-detergent gun any child could handle – it's that light, that safe – but see what it does! Hitch it to your steam supply, aim it at your toughest cleaning job. Watch it slam into heavy pitch, scale, slime. It's almost like "wishing" the dirt away.

Steam-gunning with a hot detergent solution isn't new. What's new is a steam gun that's not heavy, not cumbersome, not dangerously hot.

Light ... Here is a gun that weighs only six and a quarter pounds, yet packs a heavyweight cleaning punch.

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Find out how the "Hurriclean" gun can save your mill money by blasting pulp, slime and soil from hard-to-reach corners of tanks and equipment ... and how it saves time on special jobs like paint stripping. Call your Oakite Technical Service Representative or write for booklet. Oakite Products, Inc., 48A Rector St., New York 6, N.Y.

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Export Division Cable Address: Oakite

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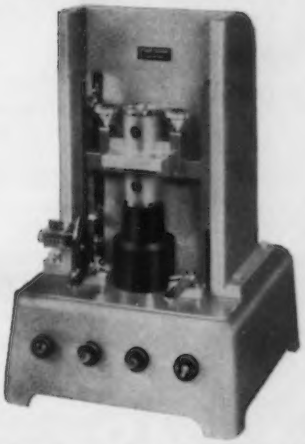
DON'T BE LEFT HOLDING THE BAG!

measure its paper strength with the

frag-tester



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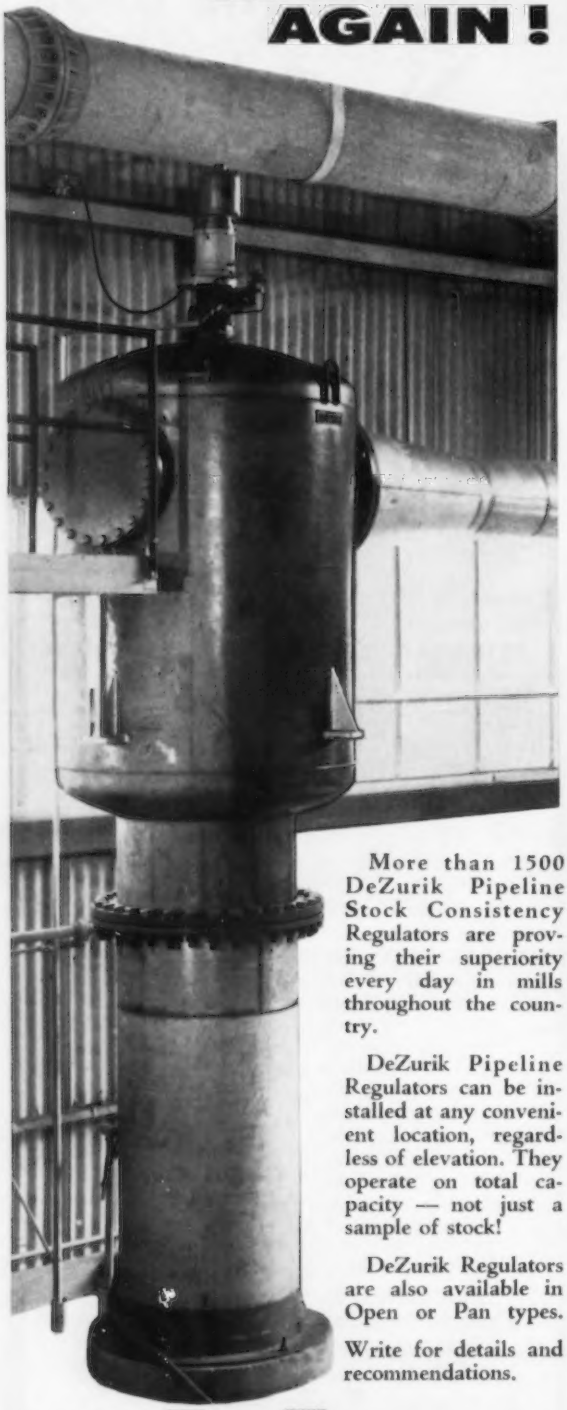

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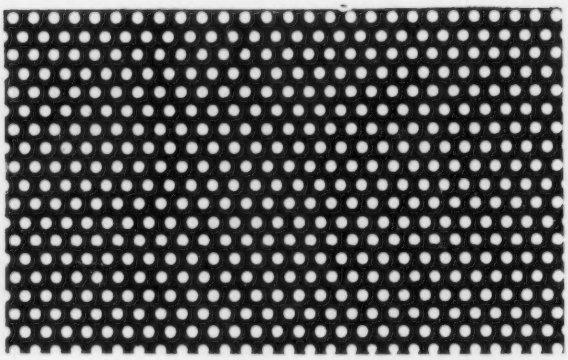

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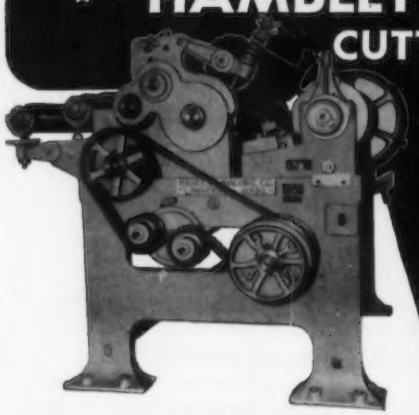

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Heavy Duty: Single and Duplex from 100″ to 200″ wide. Knife capacity 450 pounds. Speeds to 600 feet per minute. Also used on special heavy cutting applications below 100″ width.

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No Rag Jamming Uniform Cutting Easy Cleaning

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Wider space between cutting element and frame prevents jamming of rags.

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Fig. 1834 Constant Level Oil Control

Fig. 1815 Globe Body Bottle Oiler

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Fig. 1300 Sight Feed Oil Cup

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I am a paper man myself. If your record of performance entitles you to increased responsibility and greater potential, I can and will help you to attain it. You may contact us in absolute confidence.

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Machinist, preferably in early forties, to work in one-machine paper mill in Northern Wisconsin. Must have experience in the use of machinist hand tools and machine tools, be able to understand blueprints and written specifications, possess knowledge of shop math, be familiar with working properties of metal, and be able to work with close tolerances. Mill has closed shop and workers are represented by the United Papermakers and Paperworkers, AFL-CIO. Two weeks vacation after five years and three weeks after fifteen years. Group insurance plan and six paid holidays. Reply, giving experience and qualifications to box number 58-46 c/o Paper Trade Journal.
F-24

Help Wanted

WANTED—GENERAL MANAGER

Owners of Specialty Paper Board Mill wish to retire. Opportunity to become General Manager immediately. Investment necessary. Substantial amount of common stock immediately available. Cylinder board mill experience absolutely necessary. Replies confidential. Reply Box 58-55 Paper Trade Journal. M-10

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Wanted for New England converting mill. This is a responsible management position and requires an able man, capable of independent judgment and some knowledge of converting paper. Salary is open. Send fullest details, including desired salary. Your replies will be kept in strict confidence. Our people know of this ad. Address Box 58-54 care Paper Trade Journal. F-24

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PAPERBOARD SALESMAN

Age preference 30-45, to work for independently owned paperboard mill, with residence in most desirable city having ideal climatic conditions and opportunity to be home every weekend.

Must have knowledge of all grades folding and setup boxboard; desirable to also have carton experience.

All replies confidential. Address Box 58-38, PAPER TRADE JOURNAL.
F-24

MACHINE TENDER for one machine Toweling mill. Location—East. State age, experience and salary expected. Replies confidential, Address Box 58-52 care Paper Trade Journal. F-24

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$6000 to $60,000. Want a substantial salary increase, more opportunity or different location? This national 47 year old service connects you with best openings. You pay us only nominal fee for negotiations; This we refund when employer pays placement fee. Present position protected. In complete confidence, write for particulars. R. W. Bixby, Inc., 563 Brisbane Bldg., Buffalo 3, N. Y.
F-24

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Experienced In Low Density Papers

Our client, a well known and highly regarded pulp mill in the South, has engaged us to help locate a suitably quaified Consulting Engineer to assist in the selection, purchase and installation of a used Fourdrinier and subsidiary equipment to commence manufacture of low density papers such as filter, absorbent, impregnating, etc. Actual experience in these or similar grades a must.

Financial arrangements will be liberal and are subject to negotiation on a per diem, weekly or project basis.

Contact us for confidential details.

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WOODPULP HOUSE

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JUNIOR EXECUTIVE

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Please submit complete resume of personal background, experience and salary expected. Replies will be held in confidence.

Address Box 55-56 care Paper Trade Journal
M-3

Help Wanted

WANTED

ASSISTANT KRAFT MILL SUPERINTENDENT

Integrated mill in Northeast requires technically trained man, preferably in his thirties, with Kraft experience to assist in start-up and operation of modern, bleached sulphate mill now nearing completion. Right man will find excellent opportunity for advancement to Mill Superintendent within reasonable time.

Address Box 58-8 care Paper Trade Journal. M-3

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Wanted by manufacturer of paper and film bag machinery and printing presses.

Located in pleasant New Jersey community.

Degree not necessary—only the ability and practical background for independent design of converting machinery.

Excellent opportunity for capable man. Salary open.

Please send resume of experience. Box 58-13 care Paper Trade Journal. TF

Paper Mill Superintendent or Paper Mill Manager

Capable of assuming full responsibility together with adequate authority for the operation of a 3 machine tissue mill operating over speed ranges of 1000-2000 FPM.

Must be familiar with the engineering fundamentals of machinery for production of high speed dry crepe as well as good foundation in the maintenance of such equipment. Salary open. Address Box 58-28 care Paper Trade Journal. TF

WANTED: Specialty board mill in Massachusetts needs a tour boss. Young man with experience running cylinder job preferred. Address Box 58-50 care Paper Trade Journal. M-3

MILL SUPERINTENDENT for one machine Toweling mill. Location—East. State age, experience and salary expected. Replies confidential. Address Box 58-53 care Paper Trade Journal. F-24

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1—134" Fourdrinier, 30" wia, suction couch stainless steel headbox with Voith type inlet, 80' wire, 2 presses, 1 suction, 39 dryers, 48" dia., double deck, calender stack, reel, winder and drives.
1—132" Single Cylinder Yankee Machine complete, dryer 10 ft. by 132", enclosed angle drives, pulper, Jordan etc., all motorized. The buy of the times.
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1—25" Dia. x 156" Sandusky Suction Couch. Complete with Bearings and Stands.
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1—54" dia. x 48" Face Valley Iron Tub Beater.
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1—Valley Iron Wks. 750 lbs. Iron Tub.
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1—Lobdell 82"—5 roll.
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1—Lobdell 86" five roll.
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1—B & C 124" 6 roll.
1—Downingtown 128" 7 roll, complete.
1—Farrel 152"—frames for 11 rolls with 5 rolls.

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1—National model AS Auto. metal edger
1—ABC Case Sealer—adjustable.
1—Knowlton 42" Core Cutter, with motor.
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1—Hudson-Sharp model GL-2 2-ply laminator.
1—Knowlton 60" lap tube roller 4 ply.

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1—Dowingtown 99" single cyl. wet end comp. w/18" dia. couch etc.
1—Beloit 7 cyl. 132" wet end comp. Cyl. 36" dia. Couches 18" dia. Includes 4 sets primary & main presses.

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1—72" face x 48" diameter.
1—73" face x 48" dia.
1—74" face x 36" dia.
1—92" face x 30" dia.
1—102" face x 36" dia.
2—104" face x 36" diameter.
1—107" face & 48" dia.—A.F. brgs
2—111" face x 36" dia.—A.F. brgs.
2—132" face x 36" dia.—A. F. Brgs.
1—132" face x 42" dia.—A. F. Brgs.
1—136" face x 54" dia. stainless steel covering.

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2—46" face x 16" dia. & accessories.
2—46" face x 36" dia.
40—46" face x 24" dia. chrome plated
58—46" face x 48" dia. chrome plated
1—52" face x 48" dia., gear bearings.
1—67" face x 36" dia.
1—68" face x 36" diameter.
8—72" face x 36" dia. with AF bearings.
1—74" face x 36" dia. Lukenweld—A.F. Brgs.
17—75" face x 36" dia., with gears & brgs.
3—76" face x 36" dia. with gears.
28—80" face x 36" dia. Complete section.
10—80" face x 48" dia., with gears & bearings.
1—82" face x 48" dia., gears & bearings.
2—84" face x 28" dia.
2—88" face x 36" dia.
5—88" face x 48" dia. w/ace.
1—90" face x 18" dia. with A-F bearings.
9—90" face x 48" dia. with gears & bearings.
41—94" face x 48" dia. Complete section.
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1—104" face x 36" dia.
1—110" face x 42" dia.
1—120" face x 42" dia.
1—124" face x 48" dia.
1—126" face x 48" dia.
27—127" face x 42" dia.
1—130" face x 48" dia.
1—138" face x 36" diameter.
2—160" face x 28" dia. with rope carriers.
10—160" face x 36" dia.
1—160" face x 42" dia.
14—160" face x 48" dia.

EMBOSSERS

1—80" Hudson Sharp A.F. Bearing equipped.

EXTRACTOR ROLLS

1—Downingtown 24" x 134" plain extractor with 18" x 136" R.C. couch roll.

FILTERS

1—Oliver continuous filter, cylinder 8 ft. diameter x 10 ft. face, steel vat. Used 2 months.

FLAT SCREENS

1—Impco 10 Plate—Dunbar drive, bronze vat.
1—12 plate Sandy Hill, Roller Shoe.
7—Beloit 12 plate—Witham Fasteners.
2—IMPCO 12 plate—w/Braemer controls.

JORDANS

1—Appleton #2 anti-friction bearings.
1—Smith & Winchester with granite filling.
1—E. D. Jones #4 (Imperial) with A. F. brg.
1—N & W Mammoth, Jr.
1—N & W Monarch.
1—N & W Bulldog half inch bars.

LABORATORY EQUIPMENT

Valley Iron Wks. pulp test equipment consisting of couch roll, sheet mould, hydraulic press, hot plate with boiler. Like new condition.

MOTORS

1—300 H.P. West. 388 RPM, 440-3-60.
1—GE 350 H.P. syn. 3/60/2200—720 R.P.M.
3—GE 150 H.P. 3/60/440—435 R.P.M.
3—GE 100 H.P. 3/60/440—435 R.P.M.
1—GE 100 H.P. 3/60/440 695 R.P.M.

PULP EQUIPMENT

3—2 ft. x 8 ft. type Tyler screens.
1—Jones pulp screen. Cylinder 40" dia. x 83".

PUMPS

44—Centrifugal Pumps open & closed impellers.
7—Beloit 8" x 10" Fan Pumps.

REELS

1—Kohler 100" 2 arm unwind Reel. Accommodates 60" dia. rolls. Completely automatic. Equipped with splicer. New condition.
1—Bagley Sewall Pope Reel—Drum 150" face x 36" dia. Complete with Reliance Drive.
1—Downingtown 94"—2 bowl—60" rolls.

REFINERS

1—34" Southerland disc refiner, late model.
1—24" Dowingtown Weiner refiner. New.
1—Diltz classifiner w/spare discs.
1—#1 Clafin Refiner. Anti friction bearing.

ROLL GRINDERS

1—Farrel Birmingham — complete with motor drive. For rolls 30" x 160".

ROLLS—PRESS, COUCH, CALENDER, ETC.

350 misc. rolls. Inquiries invited.
24—153" face x 5" dia. S.S. table rolls.
7—R.C. Couch 18" dia. x 132" face with brgs.
4—Sets primary presses 12", 14" & 16" dia. x 128" face. Bottom rolls bronze. Top rolls R.C.
3—Sets main presses 22" dia. x 129" face. Top rolls stonite or bronze bottom rolls R.C.
1—Set B. and C. Crownless deflectionless main press rolls 22" dia. x 128" face R.C. Complete with A.F. brgs, framing, Foxboro Controls & rt. angle drive with clutch & pulley.
1—Set Smoothing Presses, 202" face. Top roll RC 26" dia., Bottom Roll Chrome, 24" dia.
2—98" x 18" Press Section. Complete.

ROTARY SCREENS

1—#2A Bird with copper vats.
12—3A Model 100 Bird S. S. or copper vats.
1—Jones 40" #2 Rotary Screen.

SATURATORS

1—Reichel & Drews 84" drip type. a.f. brgs. Comp. with floating looper, winder and drives.

SHEETERS

1—Kidder 65" Spot Sheeter with elec. eye.
1—Hamblet 72" single knife with layboy.
1—Hamblet 30" with 6 roll backstand.
1—B.C. 80" heavy duty Duplex board cutter.
1—M & W 80" with backstand.
1—82" Hamblet Single Knife with layboy.
1—Hamblet 100" single knife with layboy.
1—Hamblet 110" single knife sheeters.
1—M.&W. 114" Single Knife with Layboy.
1—Cameron 124" quick change slitter assembly.
1—Downingtown 124" h.d. duplex board cutter.
1—Hamblet 87" Duplex w/layboy and overlapper.

SHREDDERS

2—Mitts Merrill air fluff paper shredders.
1—Taylor Stiles giant stock Shredder style 36.

SLITTERS & WINDERS

3—Shultz 12" coreless rewind.
1—Cameron 30" Model 6 w/motor.
1—Fales 40" Model B 1" and 1¼" knives.
1—Essex 42" duplex—30" diameter rewind.
3—Cameron 44" model 6.
1—Cameron 42" Model 40-1A—22" rewind.
1—Hudson Sharp 48" Wax Paper Converter.
1—Cameron 52" Model 24-3A, duplex rewind.
1—Cameron 52" Model 26-7 Duplex.
1—Langston 60" Shear Cut Slitters.
1—Hudson Sharp 60"—for plastic coated papers.
1—Hudson Sharp 60" Wax Paper Converter.
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2—Cameron 62" Model 6. 24" rewind.
1—Cameron 62" Model 9-S.
3—Cameron 62" Model 8—heavy duty.
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1—Hudson-Sharp 72" high speed automatic.
1—Warren 94" Machine winder—60" rolls.
1—Cameron 92" Model 10-11A, A.F. brgs.
1—Cameron 92" Model 12-A.F. brgs.—52" rewind.
1—Cameron 194" model 19, A.F. brg.

STEAM TURBINE

1—De Laval 100 H.P. Complete incl. reducer,

SUCTION COUCH ROLLS

1—Sandusky 22" diameter x 135" drilled face.
1—Sandusky 18" diameter x 116" drilled face.
1—Sandusky 25" diameter x 122" drilled face.
1—Sandusky 18" diameter x 122" drilled face.
1—Millspaugh 30" diameter x 192" drilled face.

SUCTION PRESS ROLLS

1—Millspaugh 30" dia. x 194" drilled face.
1—Downingtown 112" drilled face x 24" dia.

SUPER CALENDERS

2—Norwood 58", 13 roll glassine stacks.
1—Norwood 80", 10 roll w/motor.

THICKENERS

1—Thickener, Cylinder 92" face x 36" diameter, with R. C. Couch.

TRIMMERS—POWER BACK GAUGES

1—Seybold 45" model 10 Z.
1—Seybold 56" Dayton with motor.
1—Seybold 84"—Dayton with motor.
1—Seybold 50" Precision Model 10-ZD.
1—Seybold 84" Model 12-Z.
1—Sheridan 65" with motor.

VACUUM PUMPS

1—Nash #6 Hytor.
1—Nash #8 Hytor.
1—Connersville 7 x 10.
1—Nash H-8

VOITH INLETS

2—Valley Iron Voith Inlets, 86"—Brass lip.
1—Valley Iron Works inlet—106"
1—New Valley Iron Works 156" x 36" monel lined inlet and head box.
1—Bagley and Sewall 144" stainless steel clad high speed inlet and head box.

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1—Beloit 12' diameter x 140" face 75 #S.P.

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2—Mayer 60" complete with motor.
1—Mayer 48" complete with motor.

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(3) ONE KNOWLTON SPIRAL TUBE WINDER, or similar equipment suitable for ⅞" diameter cores and larger.
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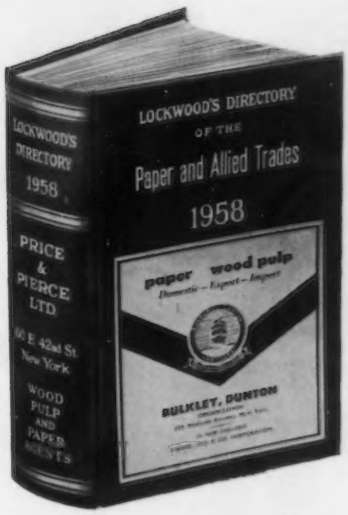

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INDEX TO ADVERTISERS

PAPER TRADE JOURNAL

A

Adell Chemical Co. ..... —
Albany Felt Co. ..... —
Allied Chemical & Dye Corp. —
Allis-Chalmers Mfg. Co. ..... —
Aluminum Co. of America ... —
American Bitumuls & Asphalt Co. ..... —
American Cyanamid Co., Dyes Dept. ..... —
American Cyanamid Co., Organic Chem. Div., ... —
American Cyanamid Co., Pigments Dept. ..... —
American Potash & Chem. Corp. —
American Steel & Wire Co. ... —
Ames Company ..... —
Antara Chemicals, Sales Div. Gen. Aniline & Film Corp. 11
Apmew, Inc. 64
Appleton Machine Co., The ... —
Appleton Wire Works ..... —
Appleton Wood Products Co. —
Armco Drainage & Metal Products ..... —
Armco Steel Corp. ..... —
Armstrong Machine Works .... —
Asten-Hill Mfg. Co. 2
Aurora Pump Div., N. Y. Air Brake ..... —

B

Babcock & Wilcox Co. ..... —
Bahr Bros. Mfg. Co. 68
Bailey Meter Co. 12
Baltimore & Ohio R. R. ..... —
Bauer Bros. Co. 61
Becco Chemical Div. Food Machy. & Chem. Corp. —
Beloit Iron Works Co. ..... —
Bird Machine Co. 21
Bixby, R. W., Inc. 69
Black-Clawson Co. ..... —
Blaw-Knox Company ..... —
Bolton & Sons ..... —
Borden Co. ..... —
Bowsher Co., N. P. ..... —
Brandon Sales, Inc. ..... —
Broughton, A. E. & Co. ..... —
Brown Company ..... —
Buckeye Cellulose Corp. ..... —
Buell Engineering Co. ..... —
Buffalo Forge Co. ..... —
Buffalo Pumps, Inc. 75

C

Cady E. L., & Co. ..... —
Cambridge Instrument Co. .... —
Cameron Machine Co. ..... —
Capitol Products Corp., Read Standard Div. ..... —
Carthage Machine Co. 62
Central National Corp. Front Cover
Chicago Bridge & Iron Co. .. —
Ciba Company ..... —
Cities Service Oil Co. ..... —
Clark-Aiken Company ..... —
Classified Advertising ..... —
Clearing House ..... —
Cleveland Crane & Engrg. Co. —
Cleveland Worm & Gear Co. —
Colonial Plastics Mfg. Co. ... 58
Columbia Cellulose ..... —
Columbia-Geneva Steel Div., U. S. Steel Corp. 63
Columbia-Southern Chem. Corp. Sub. of Pittsburgh Plate Glass Co. ..... —
Combustion Engrg. Co. ..... —
Corn Products Sales Co. ..... —
Crane Co. ..... —
Curtiss-Wright Corp ..... —

D

Davis, Frank H., Co. Inc. ... —
DeZurik Shower Co. 66
Diamond Alkali Co. ..... —
Dicalite Div., Great Lakes Carbon Corp. ..... —
Dierks Paper Co. ..... —
Dilts Machine Works ..... —
Dixie Bearings Div. of Bearings, Inc. ..... —
Dobeckmun Company ..... —
Dodge Mfg. Co. ..... —
Dorr-Oliver ..... —
Dow Chemical Co. ..... —
Dow Corning Corp. ..... —
Dowell, Inc. ..... —
Draper Bros. Co. ..... —
Dryden Paper Co. Ltd. 41
du Pont, E. I., de Nemours & Co. Dyestuffs Dept. ..... —
du Pont, E. I., de Nemours & Co., Electrochemical Dept. ..... —
du Pont, E. I., de Nemours & Co., Pigments Dept. ..... —

E

East Texas Pulp & Paper Co. —
Eaton Manufacturing Co. ... —
Ebasco Services, Inc. ..... —
Egan Frank W., & Co. 52
Elixman Paper Core Co. ..... —
Elliott Company ..... —
Elwell Parker Elec. Co. ..... —
English China Clays Sales Corp. —

F

FabriValve Company ..... —
Fairbanks, Morse & Co. 34
Falk Corporation 6
Farrel-Birmingham Co., Inc. .. —
Fife Manufacturing Co. ..... —
Fitchburg Screen Plate Co. .. —
Foxboro Co. ..... —
Frederick Iron & Steel Co. ... —
Freemen & Co. 64
Freeport Sulphur Co. ..... —

G

Gates Rubber Company .... —
Garden City Fan Co. ..... —
Garlock Packing Co. ..... —
Geigy Dyestuffs Div., Geigy Chemicals Corp. ..... —
General Dyestuffs Co. ..... —
General Electric Co. .....36 & 37
General Tire & Rubber Co. ... —
Gibbs-Brower Co. ..... —
Gilbert & Nash Co. ..... —
Glidden Company ..... —
Goodrich Industrial Prod. Co. 3
Goodyear Tire & Rubber Co. —
Gottesman & Co. .....Front Cover
Graton & Knight Co. ..... —
Grinnell Co., The ..... —
Gulf Oil Corporation ..... —
Gulf States Paper Corp. ..... —
Gurley, W. & L. E. ..... —

H

Hagan Chemicals & Controls Corp. ..... —
Hamblet Machine Co. 66
Handling Devices Co. ..... —
Harbison-Walker Refractories . —
Harris Seybold ..... —
Hendrick Mfg. Co. 66
Hercules Powder Co. ..... —
Hooker Electrochemical Co. .. —
Huber, J. M., Corp. ..... —
Hudson Sharp Machine Co. .. —
Hungerford & Terry, Inc. ... —
Huyck, F. C. & Sons ..... —

I

Improved Machinery, Inc. Facing 34
Ingersoll-Rand Co. ..... —
International Wire Works .... —

J

Jenkins Brothers ..... —
Johns-Manville Corp. ..... —
Johnson Corp. The 55
Johnson, Alvin H., & Co. ... —
Jones, E. D., & Sons Co. 60

K

Kalamazoo Tank & Silo Co. .. 68
Kamyr Inc. ..... —
Kidder Press Co. ..... —
Knox Woolen Co. ..... —
Koppers Company ..... —

L

Langston, Samuel M., Co. ... —
Link-Belt Co. ..... —
Lockport Felt Co. ..... —
Lockwood Greene Engineers .. —
Lodding Engineering ..... —
L. O. F. Glass Fibres Co. ... —
Lukens Steel Co. ..... —
Lummus Cotton Gin Co. ..... —
Lunkenheimer Co. 67
Lyddon & Co. 8

M

Magnus Metal Co. ..... —
Magnaflux Corp. ..... —
Magnuson Products Corp. .... —
Main, Charles T., Inc. 64
Manchester Machine Co. ..... —
Master Builders Co. ..... —
Mead Pulp Sales, Inc. ..... —
Merrick Scale Co. ..... —
Minneapolis-Honeywell Reg. Co. 35
Monsanto Chemical Co. Plastics Div. 53
Moore & White Co. ..... —
Morden Machines Co. ..... —
Mt. Hope Mchy. Co. ..... —
Mt. Vernon Mills Inc. ..... —
Murray, D. J., Mfg. Co. 16

N

Nash Engineering Co. ..... —
National Aluminate Co. ..... —
National Lead Co., Magnus Metal Div. ..... —
National Starch Products, Inc. 7
National Tube Div., U. S. Steel Corp. 63
Nelson Company ..... —
New Jersey Zinc Co. ..... —
Nichols Eng. & Research Corp. 9
Noble & Wood Mch. Co. ..... —
Nopco Chemical Co. ..... —
Northeastern Paper Sales 41
Norton Co. ..... —

O

Oakite Products, Inc. 65
Ohio Injector Co. ..... —
Olin Mathieson Chem. Corp. .. —
Osborne Paper Mill Equipt. Corp. 70

P

Paper Converting Machine Co. —
Parsons Whittemore 8
Patterson Fd. & Mch. Co. ..... —
Penick & Ford, Ltd. ..... —
Pennsalt Chemicals Corp. .... —
Perkins, B. F., & Sons, Inc. .. —
Perkins Goodwin Co. ..... —
Personnel Service Associates .. —
Pioneer Paper Stock Co. ..... —
Pittsburgh Piping & Equip. ... 54
Poirier Control Co. ..... —
Potdevin Machine Co. ..... —
Powell Valves ..... —
Price & Pierce, Ltd. ..... —

R

Railway Supply & Mfg. Co. .. —
Raymond, Chas. P. Service, Inc. ..... —
Rayonier, Inc. ..... —
Read Standard Div., of Capitol Products Corp. ..... —
Record Fdy. & Mch. Co. ..... —
Restigouche Corp. ..... —
Rice Barton Corp. ..... —
Riedel, Gus & Son ..... —
Riegel Paper Corp. ..... —
Rohm & Haas Co. ..... —
Ronningen-Petter Co. ..... —
Roots-Connersville Blower Div. —
Roosevelt Paper Co. ..... —
Ross J. J. Co. 70
Ross-Midwest Fulton Co. ..... —
Ross Paper Machinery Co. 71
Ruderman Machy. Exchange .. 70
Rust Engineering Co. ..... —
Ryerson, Jos. T. & Son ..... —

S

Sandoz Inc. ..... —
Sandy Hill Iron & Brass Works ..... —
Scapa Dyers Inc. ..... —
Seaboard Air Line R. R. Co. —
Shartle Div., Black-Clawson Co. .....Back Cover
Shawinigan Resins Corp. ..... —
Sheffield Corp. ..... —
Shell Chemical Corp. 13
Shuler & Benninghofen Facing 35
Signode Steel Strapping Co. ... —
Simplex Wire & Cable Co. .... —
Sirrine, J. E., Co. 68
Smidth, F. L., & Co. 14
Soderhamn Mch. Mfg. Co. .... —
Sonoco Products Co. ..... —
Southworth Machine Co. ..... —
Spraying Systems Co. ..... —
Stadler Hurter & Co. ..... —
Staley Mfg. Company 33
Stanley Works ..... —
Stebbins Engrg. Co. ..... —
Stein, Hall & Co. ..... —
Stone & Webster Engrg. Corp. —
Stowe-Woodward, Inc. ..... —
St. Regis Paper Co. ..... —
Sunday, Geo. M., Assoc. 69
Swenson Evaporator Co. ..... —
Swepco Tube Corp. ..... —

T

Taylor Instrument Co.s 10
Taylor Stiles & Co. 67
Tennessee Coal & Iron Co. .. —
Tennessee Corp. 63
Testing Machines 65
Texas Co. ..... —
Texas Gulf Sulphur Co. ..... —
Thiele Kaolin Co. ..... —
Thomas Paper Stock Co. 68
Titanium Pigment Corp. ..... —
Torrington Co. ..... —
Towmotor Corp. 43
Trent Tube Co. ..... —
Turner Halsey Co. ..... —
Tyer Rubber Co. ..... —

U

United Carbon Co., Inc. .... —
United Engrg. & Fdy. Co. .... —
United Paper Machinery Corp. —
U. S. Industrial Chem. Co., Div. of National Distillers & Chem. Corp. ..... —
U. S. Rubber Company 4
United States Steel Export 63
United States Steel Supply Co. 63
U. S. Steel Corp. 63

V

Valley Iron Works ..... —
Vanderbilt, R. T., Co. ..... —
Virginia Smelting Co. ..... —

W

Waldron, John, Corp. ..... —
Wallace & Tiernan Inc. ..... —
Walworth Co. ..... —
Weber, H. G., & Co. ..... —
West End Chemical Div. Stauffer Chem. Co. ..... —
Westvaco Chlor-Alkali Div., Food Mchy. & Chem. Corp. 57
Westinghouse Elec. Corp. ... —
West Virginia Pulp & Paper Co. 67
Weyerhaeuser Timber Co. ... 59
Whiting Corp. ..... —
Wiggins Teape & Alex Pirie —
Williams-Gray Co. ..... —
Wisconsin Wire Works ..... —
Worthington Corp. ..... —
Wyandotte Chem. Corp. ..... —
Wyatt Metal & Boiler Works . —

Y

Yale & Towne Mfg. Co. ..... —
Yarnall-Waring Co. ..... —

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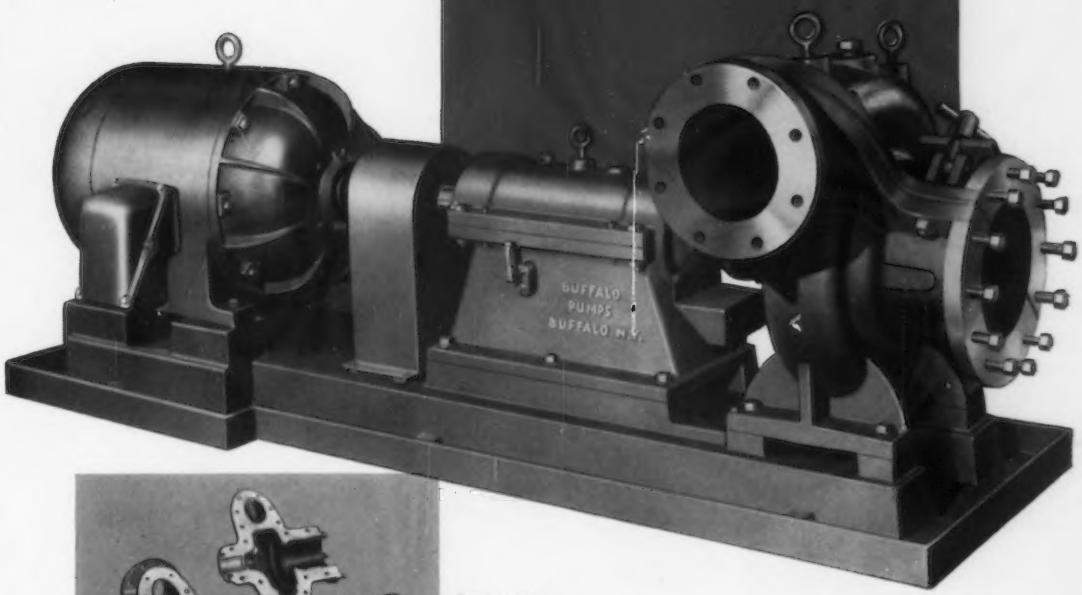

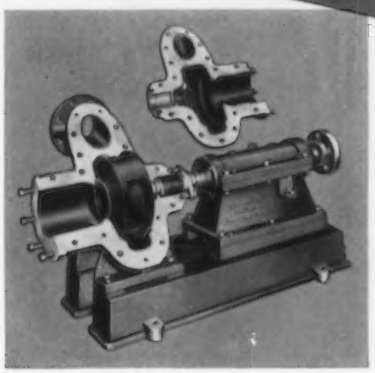

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"Buffalo" Paper Stock Pumps, such as this Diagonally Split-Shell Single Suction Type, are recognized throughout the paper industry for their efficiency, economy and long-lived dependability.

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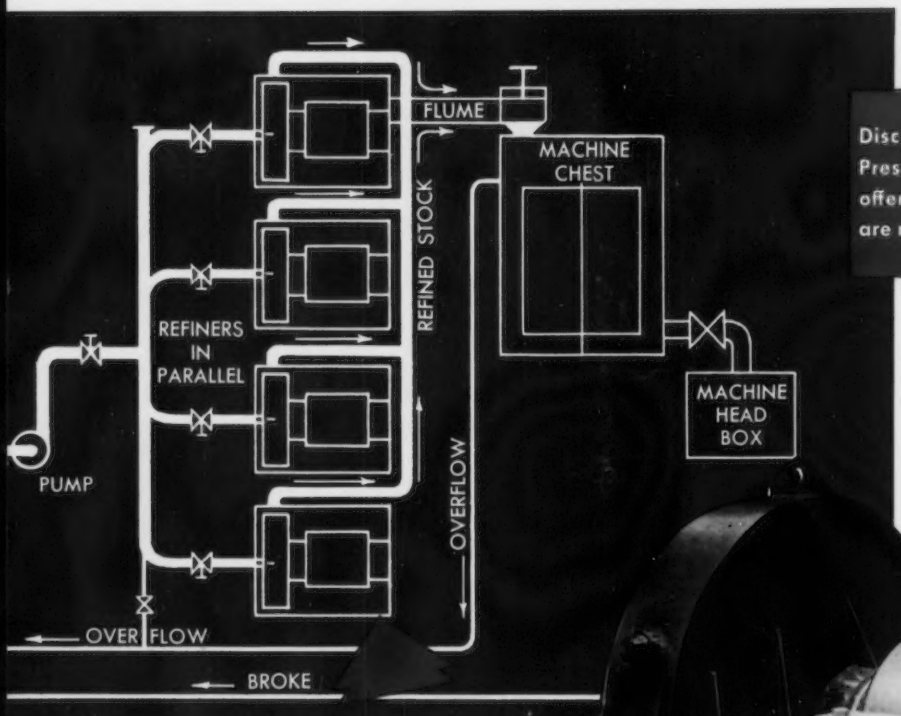

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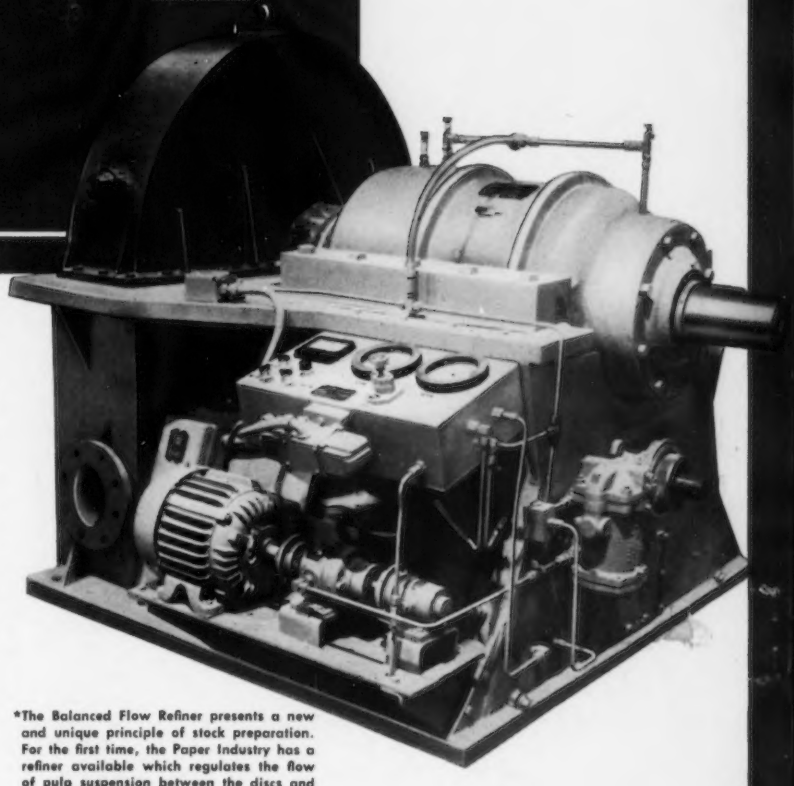

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It's possible to develop the maximum inherent qualities of any pulp—but the big problem is to do it economically and competitively.

The economical solution to this problem is the Sutherland Disc Refiner. Proved in mill applications for more than twenty years on all types of pulp, paper and board furnishes. Over 600 in use.

A single rotating disc, the result of long careful study and comparison, permits fine adjustment—controlled refining treatment. The balanced flow* principle provides for maximum flexibility and uniformity resulting in consistently high stock quality.

Low cost operation and maintenance are insured by long disc life and quick disc change when needed.

Get complete details on controlled refining—write or phone today.

*The Balanced Flow Refiner presents a new and unique principle of stock preparation. For the first time, the Paper Industry has a refiner available which regulates the flow of pulp suspension between the discs and maintains this flow in a state of balance.

THE BLACK-CLAWSON COMPANY

SHARTLE DIVISION, MIDDLETOWN, OHIO